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Carcajou (Gulo gulo), Sociétés et Conservation dans le Nord Canadien

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Résumé

Cette recherche propose comme objectif d'étudier les relations entre le carcajou et les populations locales et autochtones du Canada, dans différentes régions d'études et dans un site de conservation ex-situ. Ceci afin de mieux comprendre leurs rapports et interactions avec cet animal et de pouvoir adapter les modes de gestion de l'espèce aux besoins des sociétés mais aussi en fonction du contexte socio-culturel local. Plus particulièrement, cette étude explore d'une part les relations entre Premières Nations et le carcajou, ainsi que les perceptions et les représentations sociales que différents groupes de la société (Ainés, chasseur, trappeurs, enfants autochtones/non-autochtones) ont de cet animal, et d'autre part le rôle que joue cette espèce, en contexte de conservation ex-situ : à savoir dans un jardin zoologique, sur les connaissances et la motivation du public envers la protection du carcajou. Pour ce faire, nous avons utilisées différentes méthodes (entrevues semi-dirigées, questionnaires, dessins, observation participante) sur trois sites d'études en fonction de l'absence/présence du carcajou. Ainsi, nous avons étudié les interactions humains-carcajous dans la région North Slave dans les Territoires du Nord-Ouest auprès des populations non autochtones et autochtones (les Premières Nations Dénée et Métis), où le carcajou cohabite avec les sociétés. Nous nous sommes également intéressés à la représentation du carcajou par les membres de la Nation Naskapie au Nord du Québec et de la Nation Dénée dans les Territoires du Nord-Ouest, où le carcajou n'est plus présent depuis 40 ans. Enfin, un dernier terrain au Zoo de St Félicien au Québec nous a permis d'analyser la place de ce carnivore dans la conservation ex-situ pour le public québécois.

Les résultats ont mis en évidence, que les Premières Nations Dénées et Métis possèdent des connaissances très approfondies sur cet animal, qu'elles admirent et respectent, et ont souligné l'importance de la participation des populations et des savoirs traditionnels dans les projets de protection et conservation de cette espèce. L'analyse des connaissances et perceptions des enfants a montré que même si le carcajou ne leur est pas inconnu, de nombreuses lacunes sur l'espèce sont présentes reflétant un manque de connaissance général sur cet animal. Cependant, le carcajou reste un animal relativement bien représenté en dessin

par les enfants, même si peu d'enfants connaissent son rôle écologique. Il existe quelques différences dans la représentation de l'animal selon le territoire/province dans lequel les enfants habitent. Les données collectées au sein du zoo ont indiqué que le public, d'une région où le carcajou a disparu, ne connait pas bien le carcajou, bien qu'il évalue positivement l'intérêt de cette espèce au sein du zoo. De manière prometteuse, exposer le grand public à cette espèce dans les zoos ou dans des camps d'été pour enfants semble être un moyen efficace pour promouvoir des attitudes positives à l'égard de cette espèce et encourager le soutien des populations envers sa conservation.

Ces résultats montrent qu'il est nécessaire de mener des programmes alternatifs de sensibilisation et d'information du public au vu de la conservation et de la gestion du carcajou, en particulier dans les zones où de nouveaux programmes de gestion peuvent être mis en œuvre, afin d'accroître l'acceptation de cette espèce par la société et de sensibiliser le public à ce carnivore incompris. Cette étude souligne aussi l'importance de la participation des populations locales, adultes et enfants dans les programmes de conservation et gestion des espèces afin de garantir leur succès. De plus, les savoirs traditionnels et leur intégration dans la recherche scientifique devraient bénéficier d'une plus grande valeur. Enfin, les programmes de conservation doivent prendre en compte les souhaits des populations locales et collaborer avec elles, afin d'obtenir un plus grand succès.

Mots clés : carcajou, *Gulo gulo*, conservation in-situ et ex-situ, perception, valeurs, représentations sociales, zoo, Premières Nations, enfants, recherche qualitative

Abstract

The objective of this research is to investigate the relationships between local or First Nation people in Canada and wolverines, in different study areas and an ex-situ conservation site. In doing so, we hope to improve our understanding of these relationships and interactions with this species in order to adapt management policies and improve their fit with society's needs and the local socio-cultural context. On the one hand, this study explores relations between First Nation peoples and the wolverine as well as the perceptions and social representations of this species by different societal groups (Elders, hunters, trappers, Indigenous/non-Indigenous children). On the other hand, it tries to understand the role played by wolverines in the context of ex-situ conservation (i.e. in a zoo) and knowledge and motivation by the public towards the protection of this species. We addressed these goals through the use of multiple different methods: semi-directed interviews, questionnaires, drawings, and participant observation, and applied these techniques in three separate study sites, both with and without wolverines. For example, we studied human-wolverine interactions in the North Slave region of the Northwest Territories with Indigenous populations (Dene and Métis First Nations), where people share the land with wolverines, gathering information from both adults and children alike. We then contrasted the knowledge and perceptions of these children with those of a second group that no longer have regular contact with this species, the Naskapi Nation in northern Quebec. Finally, at the St Félicien Zoo in Quebec, we qualitatively assessed the willingness of the general public to support conservation measures for this carnivorous species.

Results indicated that Dene and Métis First Nations have a very deep knowledge of this species, which they admire and respect, which emphasized the importance of participation by First Nation peoples in the implementation of conservation programs for this species. In analyzing children's knowledge and perceptions, we found that while many children possess a basic knowledge about wolverines, there are numerous gaps in that knowledge which, if filled, may benefit future conservation efforts. Despite these gaps, the wolverine was relatively well represented in drawings by children, though their ecological role may remain be cloudy to some, and differences in their portrayal were apparent among territories/provinces in which

children live. Data collected in the zoo indicate that the general public, in a region where wolverines have become extirpated, lack some general knowledge about this species and that the level of knowledge is not equal across the greater public. Promisingly, exposure to wolverines at the zoo or through children's camps does seem to promote positive attitudes towards this species and foster support for their conservation.

These results shows that there is a need for increased awareness and public information programs for wolverine conservation, particularly in areas where new management programs may be implemented, to increase social acceptance of this species and raise public knowledge about this misunderstood carnivore. An integration of local populations, both children and adults, is necessary for a better legibility of management of the animal; as well as the valorization of traditional knowledge and its integration in scientific research. For the success of a species management program, it is inevitable to ask the people what they want and support the project. This study emphasizes the importance of participation by local populations, both adults and children, in conservation management plans for their success. Additionally, greater value should be assigned to traditional knowledge and its integration into scientific research. Finally, conservation programs must acknowledge the desires of the local populations and work together with local stakeholders if they wish to succeed.

Keywords: wolverine, Gulo gulo, in-situ and ex-situ conservation, perception, values, social representations, zoo, First Nations, children, qualitative research

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COSEPAC : Comité sur la situation des espèces en péril au Canada

COSEWIC : Committee on the Status of Endangered Wildlife in Canada

EPA : environmental protection and awareness

FAO : Food and Agriculture Organization of the United Nations

IUCN : International Union for Conservation of Nature

LEP : loi sur les espèces en péril

MEA : Millennium Ecosystem Assessment

NWT : Northwest Territories

QC : Québec

SET : Savoir Écologique Traditionnel

UNESCO: United Nations Educational, Scientific and Cultural Organization

WAZA: World Association of Zoos and Aquariums

WCIP : World council of Indigenous People

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A toi,

Chapitre 1 Introduction

> *« Carcajou se sentit fatigué de demeurer ainsi immobile sur son radeau. Il demanda à Loutre de plonger afin d'aller chercher de la terre. Mais Loutre se déclara inapte pour une telle mission. Carcajou demanda à un autre de ses jeunes frères, Vison, de s'en charger. Ce dernier accepta (...) Vison alla directement au fond et remonta avec la terre. Ainsi le monde fut créé par Carcajou ».* (Savard 1971; p.3)

Le comportement des gens envers la faune sauvage est fortement basé sur les attitudes qu'ils ont envers les animaux (Kellert, Black, & Rush, 1996; Reading, Clark, & Kellert, 2002). Dans le cas des grands carnivores, souvent, les sociétés ressentent de la peur, dû à leur caractère de prédateur, et au fait qu'ils sont souvent méconnus et peu étudiés (Bhattarai, 2009; Milenković, 2008). Dans le cas des carnivores endommageant le bétail ou volant les appâts, des attitudes négatives peuvent aboutir à des représailles. C'est le cas du carcajou (*Gulo gulo*), surnommé glouton, une espèce menacée.

Alors que, durant des années, la plupart des décisions prises par les gestionnaires de la faune sauvage ne prenait en compte que les besoins de l'espèce, aujourd'hui la compréhension de la gestion de la faune englobe les sciences sociales et les sciences naturelles. Dans le cadre de la gestion de la faune sauvage, l'attitude des sociétés envers les animaux carnivores et prédateurs est devenue un enjeux crucial (Decker, Lauber, & William, 2002). Les perceptions et les valeurs associées à un animal déterminent le comportement des sociétés humaines envers celui-ci (Bright, Manfredo, & Fulton, 2000; Dayer, Stinchfield, & Manfredo, 2007; Kellert et al., 1996; Nyhus, 2016) et vont affecter la gestion de la faune sauvage (Ericsson, Kindberg, & Bostedt, 2007). Ainsi, il est important d'étudier le contexte social et comme le note Clark et Wallace (2002, p.87): *"Understanding human social process in practical terms is important because endangered species will be saved only if social process can be made to effectively support that goal".* Selon Riley et al. (2003, p.82) : *"Wildlife managers are responding to these and other changes in the management environment by adopting management approaches that integrate biological and human dimensions and broaden stakeholder involvement in management",* la dimension humaine apparaît désormais comme

indispensable pour la mise en œuvre des programmes de conservation ou de gestion d'espèces (Decker et al., 2002). Le plus grand challenge de la conservation de la faune sauvage est probablement le manque de soutien et de mobilisation des populations (Courchamp, 2018).

Le carcajou reste le carnivore le moins étudié et le plus méconnu de l'Amérique du Nord et de la région circumboréale (Banci, 1994; Ruggiero et al., 2007). Ce carnivore est le plus grand représentant de la famille des mustélidés. La répartition de cette espèce s'étend de la Fenno-Scandinavie jusqu'en Alaska, incluant la Russie et la partie septentrionale du Canada (Banci, 1994; Kvam, Overskaug, & Sørensen, 1988), on le retrouve au sein de climats froids où il fait actuellement l'objet de plans de conservation (Lewis & Barten, 2008; Ruggiero et al., 2007; Servheen & Cross, 2010). Il n'existe pas de donnée précise quant au nombre de carcajou à l'échelle mondiale, mais le Canada détiendrait au moins 35 % de cette population (COSEPAC, 2014; Environment Canada, 2016).

Il y a un manque de données scientifiques sur cette espèce, comme la taille de son territoire, les mouvements, la densité et la dispersion (Inman et al., 2011) qui seraient nécessaires de connaitre afin de le protéger efficacement dans son habitat. Le rôle écologique des carcajous n'est pas encore très bien compris (Persson, Wedholm, & Segerström, 2009; Ruggiero et al., 2007), mais leur statut de grands carnivores menacés en fait une espèce clé pour la conservation. Autrefois distinctes les populations de carcajou du Canada sont maintenant considérées comme une seule population dont le statut est considéré comme préoccupant (COSEPAC, 2014; Environnement Canada, 2016). Les populations de carcajou de l'est (Québec et Labrador) sont considérées en voie de disparition depuis 2005 (Annexe 1 de la Loi sur les espèces en péril (LEP))[1].

Pour les sociétés autochtones, le carcajou a une grande valeur culturelle comme créateur du monde et *trickster* (Moore & Wheelock, 1990; Peastitute, 2013; Savard, 1971), malgré sa petite taille, il a également une réputation de férocité, d'agressivité et de voracité plus importante que n'importe quel autre prédateur dans le Nord Canadien (Seton, 1953). Cette perception est encore bien présente aujourd'hui (Guindon, 2011), bien que le carcajou

[1] « *En 2014, le COSEPAC a déterminé que l'espèce était constituée d'une seule population et l'a désignée comme étant « espèce préoccupante* » (Environnement Canada, 2016, p.iv).

n'ait jamais été une menace pour l'homme (Thibault, Fisher, & Ray, 2013; voir section 3.5 et chapitre 5). Les sociétés autochtones dans la région circumpolaire attachent de multiples valeurs à cette espèce. Certaines considèrent le carcajou comme un ennemi redoutable en raison de son caractère vicieux et destructeur; mais en même temps cette espèce est très respectée pour sa force et son intelligence (Cardinal, 2004). Certaines communautés attribuent au carcajou des pouvoirs de guérison et de transformation (Moore & Wheelock, 1990). D'autres peuples autochtones veulent prendre les mesures nécessaires pour assurer la survie de l'espèce (Cardinal, 2004), car l'utilisation de sa fourrure est très prisée des autochtones même si sa valeur commerciale est faible (Banci, 1994).

Les sociétés humaines sont souvent réticentes à la mise en place de programmes de protection des carnivores ou à leur réintroduction près des zones habitées à cause de leur caractère de prédateur (Bhattarai, 2009; Ericsson et al., 2007; Milenković, 2008). Connaître les perceptions, valeurs et les attitudes des populations locales envers les carnivores est donc crucial (West, Igoe, & Brockington, 2006). Au Canada, les études publiées sur les relations humains-carcajous et la perception de cet animal par les populations locales sont quasiment inexistantes, néanmoins en Scandinavie, on trouve quelques études (Ericsson et al., 2007; Landa, Lindén, & Kojola, 2000; Mannelqvist, 2010) , mais compte tenu du contexte social et politique qui diffère, elles ne sont pas généralisables au Canada. En effet, en Europe du Nord, le carcajou peut devenir un redoutable prédateur et entrer en contact plus ou moins directement avec les éleveurs de rennes. Dans les zones où le carcajou partage son habitat avec les sociétés humaines, comme dans le cas des communautés Samis (éleveurs de rennes en Scandinavie) la perception de cet animal par les populations locales est souvent affectée par leurs responsabilités auprès de leurs troupeaux (Kruuk, 2002; Sillero-Zubiri & Laurenson, 2001). De plus, lorsque ce carnivore a disparu d'un territoire, il est souvent difficile de mener des plans de réintroduction; car, bien souvent, les populations locales ne sont pas prêtes à adapter leur mode d'élevage en fonction de la présence d'un prédateur (Jäggi, 2007; Swenson et al., 2000). Dans le nord du Canada, les populations locales ne pratiquent pas l'élevage, mais la chasse et la trappe; ces deux activités dans les Territoires du Nord-Ouest, sont importantes pour les communautés autochtones qui exercent le commerce de fourrure (Slough, 2007) et cohabitent avec le carcajou sur le territoire. Même si l'animal a disparu du territoire, les populations locales ont tendance à garder en mémoire leurs impressions (Figari and Skogen

2011), c'est aussi le cas des populations autochtones du Québec dont les émotions sociales et les sentiments liées aux carcajous sont toujours présents et se retrouvent aussi dans de nombreuses histoires ou légendes (Peastitute, 2013; Savard, 1971).

À ma connaissance, actuellement aucune étude publiée n'est en mesure de rendre compte de la perception qu'ont les communautés envers le carcajou dans les Territoires du Nord-Ouest et le Nord du Québec. Cette recherche offre donc un regard croisé sur deux territoires ponctués par la présence et l'absence de ce carnivore.

De plus, il est particulièrement intéressant de comprendre quelles sont les valeurs que les nouvelles générations donnent aux carcajous car ils seront les futurs acteurs de la conservation de ce carnivore, et à ce jour aucune étude n'a été réalisée sur la perception du carcajou par les jeunes. Au vu de ce constat, il a été choisi de faire une comparaison entre la perception du carcajou par des enfants issus de cultures différentes dans l'ouest du Canada et dans l'est du pays. Ce projet permettra aussi d'avoir une meilleure perception de la vision des autochtones sur cet animal et de comprendre la place qu'il occupe dans leur culture. En plus de nous intéresser à la perception des populations locales envers la conservation in-situ du carcajou, nous nous sommes intéressés à la conservation ex-situ au Zoo de St Félicien, seul zoo au Canada à détenir des carcajous captifs. S'intéresser à la perception du public envers les animaux de zoo a déjà été étudié (Ballantyne et al., 2007; Davey, 2006; Marseille, Elands, & van den Brink, 2012; Swanagan, 2000; Uozumi, 2010; Davey 199), mais, en revanche, aucune étude ne rapporte en détail le degré de connaissance et la vision du carcajou par un public visitant un zoo; ainsi que l'effet d'un camp de jour[2] sur la perception des enfants.

[2] Le camp de jour de St Félicien englobe des activités éducatives (d'une durée de 5 jours) basées sur les animaux du zoo et la conservation des espèces sensibles présentes dans le zoo

1.1 Objectifs

A la lumière des constats décrits ci-dessus, l'objectif global de cette recherche est de mieux comprendre les relations entre sociétés et carcajous dans le Nord canadien pour assurer la protection et la gestion efficace et adéquate de cette espèce, adaptée au contexte socioculturel.
Cette recherche souhaite répondre à deux questions de recherche:

1) Comment se construisent et se caractérisent les liens et interactions qu'entretiennent les sociétés locales avec le carcajou (connaissances, valeurs, attitudes, comportements)?
2) Comment les connaissances et la perception de l'animal influencent-elles l'acceptabilité sociale du carcajou[3] et la motivation/volonté des populations (urbaines et rurales) envers la conservation du carcajou et son habitat?

Afin de répondre à ces questions de recherche, quatre objectifs spécifiques ont été identifiés :

1) Caractériser les connaissances et les valeurs, les attitudes, les usages, et la motivation des trappeurs des Premières Nations Dénées et Métis dans les Territoires du Nord-Ouest, dans la région North Slave envers le carcajou – territoire où l'humain et l'animal partagent le même espace

2) Comparer le degré de connaissance et la perception que les jeunes issus de milieux ruraux ou urbains détiennent sur le carcajou dans les Territoires du Nord-Ouest, dans la région North Slave.

[3] Dans le cadre de cette thèse, le terme acceptabilité sociale envers les carnivores sera employé comme un synonyme de tolérance envers les carnivores, c'est-à-dire que les populations locales ne prendront pas action contre la présence de carnivore dans leur environnement (se référer à Bruskotter et Wilson 2014).

3) Identifier les représentations sociales du carcajou chez les jeunes de deux territoires: Les jeunes des Territoires du Nord-Ouest (autochtones et non autochtones) où le carcajou est localement présent et les jeunes Naskapis dans le Nord du Québec où le carcajou est absent.

4) Évaluer le rôle de la conservation ex-situ (en présentant un carcajou dans un zoo) sur le degré de connaissance et la motivation des populations envers la conservation du carcajou.

Cette thèse est divisée en neuf chapitres. Le chapitre 1 présente l'introduction et les principaux objectifs de cette recherche. Le chapitre 2 présente le cadre théorique avec les différents concepts clés mobilisés dans le cadre de cette recherche. Le chapitre 3 présente les trois sites d'étude, ainsi que l'espèce animale étudiée. Etant donné le contexte de cette recherche en milieu autochtone, le chapitre 4 décrit les considérations éthiques et offre une réflexion sur la place du chercheur travaillant en contexte autochtone, ainsi que les limitations de cette recherche.

Les chapitres 5 à 8 sont élaborés sous forme d'articles. Ces quatre articles traitent, de façon approfondie, respectivement des (1) interrelations que les sociétés autochtones entretiennent avec le carcajou (objectif 1); et (2) de la compréhension des connaissances et des perceptions des jeunes des Territoires du Nord-Ouest quant au carcajou (objectif 2); et (3) de la vision du carcajou, sous forme de dessin, par les enfants des territoires du Nord-Ouest et du Québec pour mieux comprendre les représentations sociales de cet animal dans chaque culture (objectif 3), et (4) l'intérêt de la conservation ex-situ et son rôle sur la perception du public de zoo (objectif 4). Le chapitre 9 est la conclusion générale de cette recherche.

Chapitre 2 Cadre théorique

Dans le cadre de cette recherche, plusieurs concepts clés seront abordés dans ce chapitre. Les relations humanimales constituent le cœur de cette recherche et c'est à partir de ce concept clé que les deux questions de recherche ont été définies. Dans un premier temps, l'épistémologie de la géographie animale sera étudiée, puis nous mobiliserons le concept des relations humanimales qui constitue la base de cette recherche ; puis nous aborderons les notions de valeurs, attitudes, perceptions et représentations sociales associées à la faune sauvage, ainsi que la géographie de la conservation et les savoirs écologiques traditionnels.

2.1 La géographie animale

Selon Bortolamiol:

> *La géographie, en abordant conjointement les espèces et leurs milieux, représente une passerelle féconde entre les sciences humaines et sociales et les sciences de la nature pour traiter du partage de territoire entre humains et non-humains, dont l'Animal est un représentant au caractère heuristique particulièrement marqué.* (Bortolamiol, Raymond, & Simon, 2017, p.387).

Ce propos est soutenue par Chanvallon (2013, p.1) qui souligne que : *« Les relations entre l'Homme et l'animal sont appréhendées avec la notion d'espace : espace vital comme distance de sécurité, espace de proximité sous contrôle, jusqu'à l'espace intime et privilégié lors de rencontres parfois extraordinaires. ».* Cependant, bien que l'animal ait toujours joué un rôle central dans les sociétés humaines comme en témoignent l'importance des animaux dans les représentations préhistoriques (p.ex. dans la Grotte de Lascaux), ou bien encore la place des animaux dans la littérature (p.ex. les fables de La Fontaine, les contes africains), (Débarre et al., 2013), la géographie animale est apparue assez tardivement (Estebanez & Gouabault, 2013).

Marsh (1856) vu comme le premier environnementaliste a réalisé la première étude en géographie portant sur une espèce animale. Cependant, l'étude des animaux sauvages est restée pendant longtemps le domaine exclusif des biologistes ; et ce n'est que vers le début du XX siècle, que les géographes ont commencé à s'intéresser à la répartition spatiale des animaux et à leurs adaptations morphologiques en fonction du milieu dans lesquels ils

évoluaient. Ce courant appelé « zoogéographie » a été influencé par des biologistes, zoologistes et naturalises comme Darwin (1859); Scalter (1858) ou bien encore Wallace (1876). Dans son ouvrage *"Animal geograhy "* publié en 1913, Newbigin analyse la répartition de la faune en fonction de l'utilisation de l'espace et pose l'animal au centre de l'étude au même titre que les plantes en biogéographie. Selon Newbigin (1913), les géographes devraient s'intéresser davantage aux adaptations des animaux à leur environnement. Hartshorne (1939) dans son livre *" The Nature of Geography "* s'intéresse aussi au concept de zoogéographie comme un élément indispensable à la géographie. Vidal de la Blache (1922), dans « *Les principes de la géographie humaine* » fait quelques allusions à la géographie animale, mais son œuvre reste très centrée sur les humains et la botanique, l'animal étant relégué au second plan.

On peut distinguer, une deuxième phase appelé la *" Cultural animal geography "* où les géographes commencent à s'intéresser aux relations humains-animaux dans le temps et l'espace. Sauer (1952) fondateur de l'école Berkley s'intéresse particulièrement aux paysages culturels façonnés par l'humain pour les animaux domestiques. Cette approche ne place pas l'animal domestiqué au cœur des études, mais c'est un élément important dans l'évolution du paysage indiquant que l'humain peut altérer son environnement dans ses relations avec l'animal en passant d'un paysage naturel à un paysage culturel (Chanteloup, 2013). Bien que peu de recherches détaillent les relations qu'entretiennent les sociétés avec les animaux, et que les travaux soient essentiellement anglophones, Bennett (1960) va proposer une recherche sur les interactions entre humains et faune d'un point de vue culturel ouvrant de nouveaux champs d'études comme l'étude de la domestication des espèces animales ou bien encore le développement d'activités comme la chasse. Grossman (1984) introduit les notions de valeurs et pratiques locales dans la relation humain-animal. L'utilisation de la domestication n'est pas seulement vue comme une ressource économique mais peut aussi être vu comme une culture ; la culture jouant un rôle prépondérant dans les relations humains-animaux.

Il faudra cependant attendre les années 90 avec le développement ou la reconsidération des concepts et de nouvelles technologies (SIG et radiotélémétrie), pour que l'animal trouve toute sa place en géographie (Chanteloup, 2013, p.18). La géographie animale culturelle se renouvelle, créant une interphase avec la géographie humaine, l'anthropologie, les sciences naturelles, l'éthique environnementale et la philosophie (Emel, Wilbert, & Wolch, 2002).

Cette géographie animale ne s'intéresse plus strictement au point de vue humain, mais intègre, aux recherches, l'animal en tant qu'être à part entière en étudiant la complexité des relations humains-animaux (Staszak, 2002). Wolch & Emel (1995) proposent de revoir la position de l'animal en géographie et de le replacer au centre des études. Cette nouvelle géographie animale se différencie en plaçant les animaux au centre du sujet d'étude et en élargissant les relations humains-animaux non plus à la domestication, mais à toutes les interactions que cela soit au niveau du tourisme, des laboratoires d'expérimentations, de l'industrie pharmaceutique, dans les zoos ou bien encore dans les aires protégées. Désormais, l'éthique animale et la protection des espèces animales occupent le devant de la scène, notamment avec les travaux de Lynn (1998a, 1998b). Selon la culture, l'animal a aussi une valeur symbolique (Instone, 1998), et *"we must understand that not only are humans working out relations with animals, but human groups are also competing, confronting, and conforming with each other about animals in addition to having relations to them " (*Urbanik, 2012, p.39).

Encore éparses avant 1990, les travaux des géographes francophones en géographie animal (Bortolamiol et al. 2017), proposent à partir des années 2000 une approche axée sur les rapports et interactions entre humains et animaux, aussi appelé « géographie humanimale » (Bortolamiol et al., 2017; Estebanez, 2017; Estebanez & Gouabault, 2013). Cette géographie humanimale propose une nouvelle vision :

> *Mettre en valeur une géographie partagée, c'est-à-dire de mettre l'accent sur la relation. Il ne s'agit en effet pas de s'intéresser aux animaux, en tant que tels – ce que prend par exemple en charge une branche de la biologie des animaux- mais bien ce en quoi nous partageons un monde commun.* (Estebanez, 2017, p.49).

Selon Urbanik (2012), la géographie animale permet de relier l'humain et l'animal *"Animal geography argues that regarding humans as the pivot of the world no longer makes sense and that we are so deeply intertwined with other species, the only way we can understand ourselves is to understand them and our relations to them. "*(Urbanik, 2012, p.43). Pour notre étude, nous retiendrons cette définition d'*« une géographie partagée […], la société ne s'arrête pas aux humains, mais intègre d'autres acteurs.* » (Estebanez & Gouabault, 2013, p.1). La géographie animale permet donc une approche innovante de l'animal en l'intégrant à la recherche en tant qu'acteur (Bortolamiol et al., 2017) et en insistant sur les interrelations entre les sociétés et la faune.

Certains auteurs, comme Estebanez et Gouabault (2013) proposent de nouvelles façons de penser et voient les animaux ayant une agentivité, c'est-à-dire une conscience subjective leur permettant de prendre des décisions de manières autonomes et de contrôler leurs actions. Descola (2005, p.241) s'appuie sur ses études menées auprès du peuple autochtone Achuar en Amérique du sud pour affirmer que « *la séparation nature/culture n'existe qu'en Occident* ». Selon lui, et en se basant sur la distinction entre « *l'intériorité* » et « *la physicalité* » les animaux partagent avec les êtres humains une conscience, une âme (Descola, 2005). Dans de nombreuses sociétés autochtones, l'humain et les animaux font partie du cercle de la vie et sont intrinsèquement interconnectés : l'humain n'est pas supérieur à l'animal, ils sont tous les deux sur un pied d'égalité et partagent le même environnement (Clark & Slocombe, 2009; Deroche, 2008). Il en résulte un lien spirituel qui peut se rompre s'il y a un déséquilibre (Deroche, 2008). Selon Legge et Robinson (2017, p.3):"*First Nations oral knowledge portray animals as thinking, talking, and living much as humans do. This view of animals is not anthropomorphism—that is, human traits projected onto animals"* mais il s'agit plutôt de ce que Hornborg (2013, p.22) nomme *"personhood as the common essence of both animals and humans. A human is a human, a beaver is a beaver, but they are both persons."*. Cela renvoie également à Absolon (2010) qui fait référence au cadre « *wholistic*» autochtone où tout est lié.

L'apprentissage et la transmission du savoir dans de nombreuses sociétés autochtones se font à travers des récits, des légendes, des rituels dans lesquels les animaux jouent souvent un rôle central. Ces récits se situent dans un temps passé où les humains pouvaient parler et communiquer avec les animaux. Cette représentation des animaux est essentielle à notre recherche. La géographie animale nous semble un concept particulièrement bien adapté pour étudier les rapports (conflictuels ou non), interactions et perceptions entre le carcajou et les sociétés humaines partageant le même territoire, comme Urbanik le souligne (2012, p.187) à propos de la faune sauvage : *"We have not always seen them but they have always been there. Animal geography has given you the tools to "see" animals."*.

2.2 Les relations entre les humains et les animaux

La relation humains-animaux se pose différemment selon le contexte et la localisation géographique. Pendant longtemps, les animaux sauvages ont été vus comme des espèces

exploitables et dont l'utilisation pouvait se faire sans conséquence. Aujourd'hui avec les connaissances actuelles, nous constatons que des populations animales peuvent disparaître ou ont malheureusement déjà disparu (Breitenmoser et al., 2001; Gittleman, 1989; IUCN, 2013; Woodroffe, 2001). Souvent le maintien des espèces animales va dépendre non seulement des programmes de protection en place et de la volonté des gouvernements à agir, mais aussi, et presque toujours de l'intérêt des sociétés pour leurs environnements et pour les animaux qui font partie de leur biodiversité (Current Conservation, 2010; Kansky, Kidd, & Knight, 2016; Kansky & Knight, 2014; Manfredo, 2008; Marker, Mills, & MacDonald, 2003; Romañach, Lindsey, & Woodroffe, 2007; Treves & Bruskotter, 2014). Depuis toujours, les humains ont été en contact avec les animaux qu'ils vont évaluer selon le contexte et la situation ; par exemple, le classement des espèces sauvages qui auront une importance sociale et culturelle est en général basé sur les ressources qu'ils peuvent apporter aux humains (Woodroffe, Thirgood, & Rabinowitz, 2005b). Les animaux ont une grande importance pour les populations humaines et interagissent avec elles (voir section 2.2.1 et 2.2.2). Par exemple selon Servais, (2007) : « *En Amérique du Sud […], il est commun de doter certaines espèces animales de propriétés sociales ou mentales que nous réservons à l'espèce humaine. Les animaux sont des partenaires sociaux à part entière* » (Servais, 2007, p.46), ceci est aussi le cas dans de nombreuses sociétés autochtones (Absolon, 2010). Mais cette relation basée sur le respect, peut aussi devenir conflictuel lorsque l'animal affecte le mode de vie des populations locales et que ces dernières « subissent » négativement les effets de la cohabitation avec la faune. Il est aussi important de connaître les relations entre les sociétés et les animaux afin de comprendre d'où viennent les conflits, ainsi selon Hill (2015) :

> *knowledge of different symbolic meanings of wild animals, their social importance, and how different groups use a particular species or wildlife construction to define or articulate an environmental problem is fundamental to understanding conflicts around wildlife.* (Hill, 2015, p.299).

2.2.1 Le rôle de l'animal dans la culture autochtone

Les peuples autochtones notamment les Premières Nations possèdent de nombreuses connaissances en écologie qui sont transmises de générations en générations à travers des légendes, des rituels ou bien des cérémonies (Deroche, 2008; Legge & Robinson, 2017). Il

n'existe pas de hiérarchie dans leur cosmovision, l'humain et l'animal sont sur un même pied d'égalité et partagent le même environnement (Deroche, 2008). Dans la plupart des cultures autochtones, l'animal est capable de penser, de parler, d'agir, et d'avoir des sentiments (Legge & Robinson, 2017, voir aussi section 2.1). L'humain et les animaux font partie du cercle de la vie et sont interconnectés par un lien spirituel pouvant se rompre s'il y a un déséquilibre (Deroche, 2008). L'animal est aussi vu comme un protecteur, "*I often felt close to the animals and knew that the spirits around me would protect me and watch me when I was in the bush alone".* (Absolon, 2009, in Legge & Robinson, 2017, p.7).

Les animaux notamment les carnivores ont une importance sociale et culturelle et vont jouer un rôle dans la spiritualité (Bird, 2005). Cette importance peut venir du fait que les animaux apportent des ressources aux populations autochtones (Woodroffe et al., 2005a) ou alors juste parce que l'animal est vénéré en tant que tel, ainsi Legge et Robinson (2017, p.7) note : "*the participation is spiritual, such as when a person embodies an animal through dance, or when animal bodies are used to create objects which possess spiritual power*" ou encore Harrod (2000, p.90) observe que *"dancing or ritual involving animal body parts invoked the power of particular animal masters or animal spirits".* (Harrod 2000, p. 90, cité dans Legge & Robinson, 2017, p.7). L'animal devient un " *master spirit* " et se positionne comme : *"1) as part of kinship systems; 2) as sources of wisdom and protection; 3) as ceremonially significant; and 4) as historically important."* (Legge & Robinson, 2017, p.3). L'animal peut être considéré comme un guide spirituel, un conseiller ou bien un protecteur des sociétés humaines (Legge & Robinson, 2017).

Les animaux ont un rôle très important dans l'héritage culturel (Bird, 2005) : *"animal studies have demonstrated that agency in human-animal interactions proves complex and irrepressible*". (Armstrong, 2002, p.416). Dans les cultures autochtones, on trouve fréquemment des légendes qui mettent en scène des animaux afin de transmettre les savoirs aux jeunes générations (Pivetti, 2005). Ces récits basés sur de nombreuses valeurs telles que l'amour, l'amitié, le respect, l'identité, la sagesse, le partage, la fidélité (Bird, 2005) donnent des explications fondamentales concernant la création de l'univers et la naissance de la vie (Moore & Wheelock, 1990). Ainsi, il existe de nombreuses légendes et histoires sur le carcajou dans les cultures Dénées, Naskapie ou Innus (Millman, 1993; Moore & Wheelock, 1990; Peastitute, 2013; Savard, 1971) qui étaient transmises par voie orale par les aînés de la

communauté aux jeunes générations. De même, le peuple Yukaghirs (au Nord de la Sibérie) considère les animaux comme des personnes:

> *In their world, persons can take on a variety of forms, of which human beings are only one. They can appear in the shape of rivers, trees, and spirits, but it is, above all, mammals that Yukaghirs commonly see as 'other-than-human persons' (Hallowell 1960, p.36). Moreover, humans and animals can move in and out of different species.* (Willerslev, 2004, p.629).

Les animaux ont aussi une importance historique, contribuant depuis longtemps à la survie des humains, et à leur localisation (les populations humaines s'établissant là où il y a des animaux, (Legge & Robinson, 2017).Todd (2014) dans son étude '*Fish pluralities'* s'intéresse à la place que peut prendre les poissons dans les communautés autochtones et la complexité de leurs relations avec ces animaux d'un point de vue culturel, mais aussi social, économique et politique : "*Humans and fish, together, share complex and nuanced political and social landscapes that shape life in the community".* (Todd, 2014, p.218) ; définissant cette interaction comme une approche de l'engagement de la vie en communauté mais aussi un lieu de négociation de conflits et de réconciliation (Todd, 2014).

Le carcajou, animal central de notre étude, occupe une place importante dans la cosmovision des peuples arctiques, ainsi, le carcajou serait à l'origine de la création du monde dans les mythes Innus et Naskapis (Savard, 1971). Dans les Territoires du Nord-Ouest, où les Dénés et les Métis cohabitent avec le carcajou, cet animal est également présent dans de nombreuses légendes (Moore & Wheelock, 1990). Si le carcajou est admiré pour sa force, dans le Grand Nord, il est aussi l'animal qui est perçut le plus négativement. La relation entre les populations humaines et le carcajou est souvent ambiguë : il est respecté et admiré mais aussi personnifié comme un voleur, un malin qui joue des tours. Le carcajou peut donc être vu positivement ou négativement selon le contexte et les sociétés (voir chapitre 5). Ainsi, les Cris, le nomme « *ommethatsees* »[4] (celui qui aime voler) ou « *ogaymotatowagu* »[5] (celui qui vole la fourrure) en référence au fait que le carcajou est connu pour voler les appâts des pièges, enlever les animaux pris (Banci, 1994), et voler la nourriture des cabanes et des caches (Seton,

[4] one who like to steal

[5] one who steals fur

1953). Son autre nom, glouton fait référence à son appétit vorace (Banci, 1994). Certains l'appellent aussi « *skunk bear* » car il marque sa nourriture avec son musc ou son urine (Banci, 1994) ; enfin d'autres le nomment aussi « *Indian Devil* » (Pasitschniak-Arts & Larivière, 1995) en référence à son comportement.

Dans cette recherche, nous nous sommes interessés aux peuples Dénés et Métis, qui cohabitent avec le Carcajou, et à leurs relations avec cet animal, et aux Naskapis qui habitent un territoire où le carcajou a disparu.

2.2.2 Les conflits humains-animaux sauvages

Pour des soucis de clarté et en lien avec cette recherche, les conflits humanimales ne traiteront que des conflits avec les espèces carnivores. Les nombreux conflits en lien avec les herbivores (notamment en Afrique avec les éléphants) ne seront pas aborder.

Les conflits humains-faune sauvage se traduisent souvent par des nuisances provoquées par des espèces animales sauvages qui apparaissent généralement de deux façons : l'animal sort de la zone que la société lui a attribuée (parc national, forêt protégée…) ou alors l'humain empiète, pénètre sur le territoire occupé par l'animal sauvage (Marchand, 2013). La FAO (Food and Agriculture Organization of the United Nations) a publié plusieurs rapports faisant état d'une augmentation des conflits humains-animaux (Distefano, 2005; FAO, 2009; Marchand, 2013).

Depuis longtemps, les populations locales et les carnivores se partagent le territoire et ces derniers entrent de plus en plus en interactions avec les humains. Les carnivores ne sont pas toujours bien tolérés ou acceptés par les communautés locales (Lucherini & Merino, 2008; Schwartz, Swenson, & Miller, 2003). En effet, la présence de prédateur proche d'une zone habitée est souvent synonyme de conflit (Hemson et al., 2009; Okech, 2011; Persson, Ericsson, & Segerström, 2009; Williams, Ericsson, & Heberlein, 2002) et la prédation est la première cause de conflit (Gusset et al., 2009; Wang & MacDonald, 2006; Woodroffe et al., 2005b) lorsque les animaux sauvages entrent en interactions avec les animaux d'élevage ou les animaux domestiques (Dar et al., 2009; Lagendijk & Gusset, 2008; Lucherini & Merino, 2008; Treves & Karanth, 2003; Wang & MacDonald, 2006). La mort de l'animal afin de résoudre les conflits est la cause majeure du déclin des populations de carnivores dans le monde, cela peut

même conduire à l'extinction d'une espèce (Lucherini & Merino, 2008; Treves & Karanth, 2003). Les populations les plus touchées par les conflits humains-animaux sauvages sont souvent les populations locales et autochtones qui vivent en contact quotidien avec ces animaux dans des régions dont les ressources premières sont l'agriculture et l'élevage (Oli, Taylor, & Rogers, 1994). Ces deux activités avec la chasse et le tourisme sont les principales causes de conflits (Soliku & Schraml, 2018). En cas de perte d'animaux, les communautés locales ne perçoivent pas toujours les compensations financières qui leur sont dues et il devient plus facile pour les communautés locales de régler elle-même leurs problèmes et d'avoir recours à la chasse et à la mort de l'animal (Gusset et al., 2009).

De nombreuses études montrent qu'il est souvent difficile d'avoir le soutien des populations locales dans les programmes de conservation des carnivores quand ils sont la cause de conflits (Kleiman, 1989; Reading & Kellert, 1993; Treves et al., 2006). Depuis plusieurs années, des plans de gestion et conservation de la faune, favorables à la réintroduction des carnivores, ont vu le jour malgré parfois le peu de soutien du public (Fritts et al., 1997). En général, les communautés locales ne sont pas favorables aux mesures de réintroduction ou à la protection des carnivores quand elles sont situées proche des zones habitées (Ericsson et al., 2007; Oli et al., 1994; Williams et al., 2002). De plus, une meilleure compréhension des problèmes causés par les carnivores envers les populations humaines serait essentielle aux succès des programmes de protection et conservation de la faune (Liu et al., 2011; Okech, 2011).

Plusieurs auteurs soutiennent qu'une sensibilisation des populations locales pourrait changer la perception que ces dernières ont envers les animaux sauvages et augmenter les attitudes positives envers les animaux (Bath, 1998; Kellert, 1985; Morzillo et al., 2007). Cependant, Reading et Kellert (1993) et Kleiman, (1989) sont plus hésitants et trouvent que promouvoir l'information et l'éducation avec le but de renforcer les attitudes positives et d'augmenter le degré de connaissance sur un animal, ne va pas forcément conduire à un plus grand soutien du public, si aucune étude n'a été faite préalablement pour comprendre la perception des populations à l'égard de l'animal. Plus particulièrement dans les zones de conflits entre humains et animaux sauvages, il a été démontré qu'impliquer les résidents dans les programmes de gestion de la faune a un effet positif sur les chances de succès de tels programmes (Arroyo-Quiroz et al., 2017; Bath, 1998; Okech, 2011; West et al., 2006).

Dans le cas du carcajou, espèce clé de notre étude, certains auteurs ont montrés qu'avoir le soutien du grand public peut s'avérer difficile car le carcajou a historiquement une réputation d'être dangereux, agressif, voir même démoniaque (Ericsson, 2007; Woodford, 2014; Seton, 1953). Bien que le comportement de ce carnivore soit très similaire à ceux des autres mustélidés comme le blaireau ou le furet (Fortin et al., 2005; Hash, 1987), il n'en demeure pas moins que l'attitude des populations locales envers cette espèce est souvent négative. Cette opinion négative est surtout renforcée dans les zones où les populations locales pratiquent l'élevage ou la trappe (Ericsson & Heberlein, 2002; Oli et al., 1994, voir chapitre 5) Le carcajou est connu pour s'attaquer aux animaux d'élevage et voler les appâts des pièges sans se faire prendre (Banci, 1994; Seton, 1953, Bonamy, Herrmann, & Harbicht 2019). Aujourd'hui encore, il est difficile de changer la perception négative que les populations humaines ont envers le carcajou bien qu'à ce jour aucune attaque sur un humain n'ait jamais été répertoriée (Bonamy et al., 2019; Thibault et al., 2013).

Dans les Territoires du Nord-Ouest et dans la région North Slave, où se situe une partie de notre étude, la chasse et la trappe occupent depuis très longtemps une place clé dans les différentes communautés Autochtones Dénées et Métis qui y habitent. Le carcajou va rentrer en conflit avec les humains de deux façons : très intelligent, il est capable de pénétrer dans les cabanes ou les maisons isolées, quand il n'y a personne (Banci, 1994) ; de plus, il visite aussi les lignes de trappe et vole les appâts ou bien encore les prises (Seton, 1953). Ces deux caractéristiques ne le rendent pas toujours désirable auprès des trappeurs et des chasseurs. Au Nord du Québec, notre deuxième site d'étude, le carcajou ayant disparu de ce territoire, il n'existe pas ou plus de conflits entre l'humain et l'animal. Néanmoins, les populations semblent garder un ressentiment assez négatif envers cette espèce (Fortin et al., 2005) et ne sont pas favorables à sa réintroduction ou son éventuel retour.

2.3 Valeurs, attitudes, perceptions et représentations sociales associées à la faune sauvage

2.3.1 Les valeurs

Le concept des valeurs est un concept central en sciences humaines et sociales et joue un rôle clé dans les études humanimales. Ce concept est un objet de recherche en sociologie (Heinich, 2006) où Durkheim (1895, 1912) utilise le concept des valeurs pour expliquer le

fonctionnement et les changements sociétaux, et (Weber, 1971) pour décrire les déterminations de l'action sociale, dont celle qui peut être « *rationnelle dans l'ordre de la valeur* ». Il constitue également un sujet d'étude en psychologie (Schwartz & Bilsky, 1987), en anthropologie (Balikci, 1955) mais aussi dans les sciences de l'environnement (Kellert, 1984b) Les définitions et conceptualisations de la notion valeur sont très diverses (par.ex: Boudon, 1999; Kellert, 1985; Rokeach, 1973; Schwartz, 1996). Boudon (1998) constate que:

> *Les sciences sociales et humaines ont tendance à se répartir aujourd'hui en deux courants : celui qui fait des valeurs le produit de raisons, mais de raisons relevant essentiellement de la rationalité instrumentale ; celui qui voit dans les valeurs le produit de causes non rationnelles, et les interprète par exemple comme des effets mécaniques de la socialisation, ou encore comme dérivant de causes affectives, sociologiques ou biologiques plus ou moins conjecturales.* (Boudon 1998, p. 31).

Selon (Schwartz, 2006, p.931): « *Les valeurs sont des croyances associées de manière indissociable aux affects […], motivent l'action […], transcendent les actions et les situations spécifiques […], et guident la sélection ou l'évaluation des actions* ». Les valeurs sont liées à la communauté (la vision du monde et de la culture) en prenant pour référence les croyances ; elles sont partagées entre les membres, de ce fait, elles peuvent aussi agir comme des règles à suivre ou des normes (Germain, 2011).

Étudier les valeurs est un outil particulièrement important pour comprendre les rapports qu'entretiennent les sociétés envers l'environnement et ses composantes, comme les animaux (Kellert, 1984b; Bardi & Schwartz, 2003). Ainsi Boya-Busquet (2008, p.59) note que « *aucune société n'existe sans systèmes de croyances, de valeurs, d'idées et de pratiques orientant la communication et permettant une certaine emprise sur l'environnement.*» et Giannelloni (1998) explique que :

> *En se fondant par exemple sur la théorie des facettes (Canter, 1985), on a ainsi montré que les valeurs liées à la préoccupation pour l'environnement peuvent être réparties sur trois facettes : celles relatives à la vie - life area facet […], celles relatives à l'intérêt personnel -personal relevance – […]et celles relatives à l'échelle de l'action à l'égard de l'environnement.* (Giannelloni 1998, p.52).

Les valeurs données aux animaux par les populations locales vont être influencées par leurs choix, mais aussi leurs utilisations des ressources. Ces dernières ne sont pas uniformes sur tout le territoire, et il existera toujours une différence de valeurs et un clivage entre les populations proches des zones de présence des carnivores (zone rurale) et celles qui en sont éloignées (zone plus urbaine), (Andersone & Ozolinš, 2004; Schwartz et al., 2003; Williams et al., 2002). Le rapport à la nature et à la faune sauvage, ce que Descola (2005) appelle *« la pluralité des intelligences de la nature* » ne sera pas le même selon les préoccupations et l'activité des populations (Bath, 1998), ainsi que les contextes sociaux, politiques et culturels (Treves, 2009; Young et al., 2015). En général, les personnes agissent envers les animaux en fonction de leurs expériences, leur vécu, mais aussi de leur culture ; leur comportement sera en lien avec les valeurs qu'elles éprouvent (Bardi & Schwartz, 2003). Les valeurs peuvent être difficilement modifiables car elles sont individuelles et dépendent de caractéristiques sociales, économiques et démographiques (Kellert & Berry, 1987; Stern, Dietz, & Kalof, 1993). Le contexte historique est également très important, en effet, les précédentes relations entre l'humain et l'animal vont guider les réactions et les opinions des populations locales (Breitenmoser, 1998). En absence de connaissance sur l'espèce, les normes locales jouent aussi un rôle important dans l'orientation des attitudes et des valeurs des populations (Reading & Kellert, 1993). Selon Eriksson et al. (2015, p.132): "*Over time, repeated interaction with an attitude object forms the basis of an attitude which acts as a roadmap for a response when faced with the same, or a similar, attitude object in the future (Olson and Zanna 1993).",* ce qui nous permet non seulement d'évaluer un sujet, mais aussi d'agir en conséquence.

Kellert (1985) a défini 9 valeurs fondamentales qu'un individu peut avoir envers une espèce animale : naturaliste, écologiste, scientifique, humaniste, morale, esthétique, dominatrice, utilitaire, négative ; tandis que d'autres se sont intéressés aux valeurs ayant une dimension écologique (Berghöferet al., 2008). Différents arguments éthiques en faveur de la protection d'une espèce se développent de plus en plus. Ainsi, une espèce a le droit d'exister, même si sa valeur est intrinsèque et non dépendante des besoins humains.

En étudiant les valeurs des populations locales envers le carcajou, il sera plus facile par la suite d'adapter de futurs programmes de gestion de l'espèce.

2.3.2 Les perceptions

L'importance accordée aux différentes valeurs par un individu ou un groupe d'individus déterminent les motivations qui sous-tendent les attitudes, et peut expliquer les comportements qui en découlent (Schwartz, 1996). Les perceptions sont issus des connaissances et du contact avec le sujet (Germain, 2011; Grawitz, 1994). Les perceptions génèrent des émotions, des pensées et des opinions (Garnier & Sauvé, 1999) qui détermineront la relation entre les individus et l'objet (Sauvé & Machabbé, 2000).

2.3.3 Les attitudes

L'aspect socioéconomique peut influencer les valeurs qui conduiront à des attitudes différentes envers les animaux et une multitude de facteurs peut contribuer à une attitude négative ou positive envers une espèce (Reading & Kellert, 1993). Les attitudes se forment en général durant l'enfance et sont difficilement changeables reflétant notre perception et notre vue du monde qui nous entoure (Eriksson, Sandström, & Ericsson 2015; Olson & Zanna, 1993) Néanmoins, certains auteurs ont notés que ces attitudes peuvent changer dramatiquement et rapidement (Heberlein, 2012; Olson & Zanna, 1993).

2.3.4 Les représentations sociales

Phénomènes complexes, les représentations sociales mobilisent différents paramètres, comme le note Abric (1994) pour qui les représentations sont: « *un ensemble organisé d'opinions, d'attitudes, de croyances et d'informations se référant à un objet ou une situation.* » (Abric, 1994 p. 188). Introduit par Durkheim en 1898 qui différencie les «*représentations individuelles* » et les « *représentations collectives* », la représentation sociale est un système de conscience collective qui permet aux individus de penser et d'agir (Germain, 2011). En 1961, le psychologue social, Moscovici reprend le concept proposé par Durkheim et le place dans un cadre théorique. Il définie les représentations sociales comme :

> *Des systèmes de valeurs, des idées et des pratiques dont la fonction est double : en premier lieu, établir un ordre qui permettra aux individus de s'orienter et de maîtriser leur environnement matériel, ensuite, faciliter la communication entre les membres d'une communauté en leur procurant un code pour désigner et classifier les*

> *différents aspects de leur monde et de leur histoire individuelle et de groupe.* (Moscovici 1961, cité par Semin, 1989, p.243, cité par Gosling, 1996, p.114)

Les représentations sont au centre de la vie sociale, comme le souligne Jodelet (1989, p.36): « *la représentation sociale est une forme de connaissance, socialement élaborée et partagée, ayant une visée pratique et concourant à la construction d'une réalité commune à un ensemble social* ». Pour sa part, le psychosociologue Fisher (1987), distingue la représentation sociale de la perception et souligne que :

> *La représentation sociale est un processus d'élaboration perceptive et mentale de la réalité qui transforme les objets sociaux (personnes, contextes, situations) en catégories symboliques (valeurs, croyances, idéaologies) et leur confère un statut cognitif, permettant d'appréhender les aspects de la vie ordinaire par un recadrage de nos propres conduites à l'intérieur des interactions sociale*. (Fisher, 1987, p.118)

Au cours des deux dernières décennies, le concept de représentation sociale est de plus en plus mobilisé dans les sciences de l'environnement et en géographie (par ex: Germain, 2011; Marquis, 2001; Schwarz, André, & Sevegnani, 2012). La représentation sociale « *correspond à un ensemble de conceptions, d'attitudes, de valeurs, de significations, de connotations, d'associations, et autres éléments d'ordre cognitif ou affectif qui à la fois résultent de l'expérience de cet objet et déterminent la relation du sujet à ce dernier »* (Sauvé & Machabbé, 2000, p.183) et « *une représentation se construit, se déconstruit, se reconstruit, se structure et évolue au cœur de l'interaction avec l'objet appréhendé, alors même que l'interaction avec l'objet est déterminée par la représentation que le sujet en construit* » (Garnier & Sauvé, 1999, p.66). Les représentations sociales permettent donc une meilleure appréciation des sociétés et de leur environnement à travers leurs interactions puisque « *les représentations sont non pas une simple image de la réalité mais une organisation qui génère des significations précises. Leur processus d'élaboration est ainsi orienté par l'imaginaire et l'idéologie portant sur les relations de l'individu avec le monde* » (Boya-Busquet, 2008, p.62). Dans le cadre de notre étude, le concept de représentation sociale permettra de porter un regard nouveau sur la perception du carcajou par les sociétés et les enjeux de sa conservation. Nous retiendrons notamment les propos de Boya-Busquet (2008, p.59) : « *Ces différentes modalités de connaissance (valeurs, normes, croyances…), véhiculées par la société,*

permettent à l'individu, jour après jour, d'appréhender son environnement social et physique». Notre projet mobilise des connaissances sur les valeurs et les attitudes, mais aussi sur les représentations sociales.

2.4 La biologie de conservation et l'émergence d'une géographie de conservation

La biologie de la conservation, apparut dans les années 80, est une nouvelle approche dans la gestion des ressources et de la conservation de la biodiversité. C'est une réponse de la communauté scientifique à la crise d'extinction de la biodiversité, fragilisée par la pression des activités humaines (Soulé, 1985), la Première Conférence Internationale de la Biologie de la Conservation fut organisée en 1978 par l'écologiste Michael Soulé, qui a proposé une nouvelle approche multidisciplinaire, afin de protéger cette diversité biologique. Les objectifs de conservation de la biodiversité sont intimement liés à la dynamique des espèces ainsi qu'aux dynamiques des sociétés et des activités humaines (Soulé, 1985). Par conséquent, la biologie de la conservation s'inscrit dans un mouvement de science d'action et s'appuie à la fois sur une expertise en écologie et sur l'interface construite avec d'autres domaines scientifiques. Comme l'a souligné Primack (2010, p.3), *« La biologie de la conservation est un champ de recherches multidisciplinaires et intégrées qui s'est développée en réponse aux enjeux de préservation des espèces et des écosystèmes.*», son but premier est le maintien à long terme de la biodiversité pour promouvoir l'utilisation des ressources de façon durable et prévenir la disparition des espèces (Primack, 2010). Certains auteurs suggèrent même que les humains auraient une prédisposition génétique leur permettant naturellement d'apprécier et de valoriser la diversité biologique (Corral-Verdugo et al., 2009).

A travers ses 3 objectifs : *« documenter l'ensemble de la diversité biologique, étudier les impacts des activités humaines sur les espèces, les communautés et les écosystèmes et développer des approches pratiques pour prévenir l'extinction des espèces. »* (Primack, 2010, p.3), la biologie de la conservation se donne pour mission la protection des environnements naturels contre la pollution et la destruction en y impliquant les populations locales. En effet, il est souvent oublié que la crise traversée par la biodiversité est liée aux pressions anthropiques exercées par l'humain et qu'il faudrait donc prendre en compte cette composante (Sarrazin & Barbault, 1996; MEA, 2005; Primack, 2010; Maxwell et al., 2016; Weinzettel, Vačkář, &

Medková, 2018). Comme le suggèrent Sarrazin et Barbault (1996) utiliser le terme « *d'écologie de la conservation* » serait donc plus judicieux qu'employer le terme biologie de la conservation.

L'adoption du terme « *Anthropocène* » (Crutzen & Stoermer, 2000) soit l'Ère de l'humain, qui caractérise la période durant laquelle les impacts de l'activité humaine sur Terre sont plus importants que les processus naturels, marque un renouvellement de la réflexion épistémologique, cela se traduit aussi dans le développement de nouveaux modes de production de connaissances interdisciplinaires (Palsson et al., 2013). Cette notion entraîne la fin de certains paradigmes qui caractérisent les sciences sociales, tels que la séparation du complexe nature/culture et : *« raisonner en termes de risque et de limites permet de contourner les écueils de l'opposition traditionnellement établie entre constructivisme et réalisme, ou objectivisme.* » (Charbonnier, 2017, p.311). Le terme interpelle aussi la biologie de la conservation, et Mathevet et Poulin (2006, p.344) parlent désormais d'une: « *discipline de crise, science de l'action, la biologie de la conservation doit gérer l'incertitude, alimenter des réflexions pour des prises de décisions rapides, dans un contexte d'anthropisation aux impacts complexes.* ». Corlett (2015, p.39) note à ce sujet: "*The Anthropocene concept has already been disruptive in conservation biology, which from its inception during the late 1970s had an essentially biocentric focus [Soulé, 1985].".* Kareiva & Marvier (2011) proposent alors une *« nouvelle conservation science* » qui adopte une vision plus « *anthropocentrique* » où l'être humain constitue une espèce parmi les autres et où l'action humaine doit être prise en compte dans les décisions de conservation (Hunter, Redford, & Lindenmayer, 2014).

Dès lors, plusieurs auteurs proposent l'étude des socio-écosystèmes (Berkes & Folke, 1998; Skandrani & Prévot, 2014) comme étant essentielle en intégrant les perspectives issues de la biologie, de la géographie, de la sociologie, de l'anthropologie ou encore de l'économie. Par conséquent, la géographie représente donc un pont entre les sciences humaines et sociales et les sciences de la nature, elle s'intéresse aux relations que l'humain entretien avec son environnement ce qui lui permet de contribuer activement aux sciences de la conservation des socio-écosystèmes à l'interface humain/nature. Ainsi, au cours des dix dernières années le nouveau concept de la « *géographie de la conservation* » a émergé (Godet & Mathevet, 2015; Mathevet & Poulin, 2006). Mathevet et Poulin (2006, p.347) considèrent: *« le territoire*

comme un espace-produit, issu de l'organisation collective de la société et de la nature. », investi par les sociétés qui y habitent, l'espace devient une réalité vécue (Di Méo, 1990; Fremont, 1976). L'espace est modelé, façonné et transformé par les groupes humains pour pouvoir répondre aux besoins matériels, sociaux, culturels et spirituels des groupes et ainsi faciliter le fonctionnement des communautés (Claval, 2012). Mathevet et Poulin (2006, p.348) proposent donc que: *« Les territoires porteurs d'une culture et d'une biodiversité singulière constituent ce que nous appelons les nouveaux espaces de la conservation.* ». Grenier (2003), propose comme notion la « géodiversité », une diversité biologique et culturelle se faisant dans le temps et l'espace par spéciation géographique. Une nouvelle notion de « géodisparité» est ajouté à ce concept par Mathevet et Poulin (2006, p.348) : *« c'est-à-dire la diversité des modes d'accès, des usages et des dynamiques des interactions des ressources renouvelables et des usages ».* Par conséquent, comme le soulignent Mathevet et Poulin (2006) : le géoconservation va ainsi « *étendre l'étude de la conservation de la biodiversité à celle de la géodisparité.[…]* et

> *permettre aux écologues de la conservation de mieux appréhender l'historicité, la sociétalité, la pragmatique et le rôle des représentations et systèmes de valeurs de ces territoires. Il s'agit de dépasser la dichotomie nature/culture en considérant la biodiversité de nombreux espaces comme le fruit d'une « nature composée », formée avec l'homme comme auxiliaire*. (Mathevet & Poulin, 2006, p.349).

Les problèmes de conservation de la biodiversité ne peuvent être résolus aujourd'hui sans évaluer et intégrer les dimensions sociales, culturelles socio-économique associées, et la géographie peut donc « *mobiliser ses multiples savoir-faire sur le traitement de l'espace et du temps pour fonder une géographie de la conservation qui trouverait alors sa place dans l'édifice interdisciplinaire des sciences de la conservation* » (Mathevet & Poulin, 2006, p.349) ce qui mène la question de la biodiversité au-delà des aires protégées (Godet & Mathevet, 2015).

Dans le cadre de cette thèse autour des relations humanimales, nous mobilisons ce nouveau concept de la géographie de la conservation, pour étudier les différents acteurs (chasseurs, trappeurs, jeunes, Autochtones et non-Autochtones) à différents niveaux (local, régionaux) et leurs décisions au regard du carcajou et de sa conservation, mais également pour

mieux comprendre les effets des pratiques sur ce carnivore et les représentations qui y sont associées. La compréhension des perceptions, des attitudes et des connaissances des sociétés envers le carcajou et son évolution dans le temps et dans l'espace, est indispensable afin de mieux adapter les stratégies de conservation et de gestion au contexte local et culturel et éventuellement envisager la réintroduction de cette espèce. Enfin, nous retiendrons dans le cadre de notre recherche, les propos de Hunter et al. (2014, p.644) : "*conservation for both people and all other species will be most effective if we focus on articulating the values we share, being respectful of divergent values, and collaborating on common interests*".

2.5 Les Savoirs Écologiques Traditionnels (SET)

Au contact de la nature qui l'entoure, chaque culture a développé au fil des années, un ensemble de représentations, de connaissances, de règlements et de pratiques spirituelles et culturelles (Posey, 1999). Ce lien est maintenu par des conventions sociales et des lois coutumières (Colding & Folke, 2001). Pour comprendre les interrelations entre les communautés autochtones et les animaux, il faut d'abord comprendre, la façon dont les savoirs et les pratiques liées à l'environnement, et la cosmovision, sont accumulés et transmis au sein de ces populations (Armstrong, 2006; Maffi, 2005; Turner, 1999; Western, Strum, & Wright, 1994) Il convient donc auparavant de définir succinctement ce que représente le « savoir écologique traditionnel », concept né dans les années 80 (Berkes, 1993; Inglis, 1993; Johnson, 1992). Le savoir écologique traditionnel (SET), aussi connu sous les synonymes 'savoir traditionnel', 'savoir collectif', 'l'héritage culturel', 'savoir autochtone' ou encore 'tradition autochtone' (Deroche, 2008), est un ensemble de connaissances, pratiques et croyances détenu par un groupe de personnes vivant en contact étroit avec la nature qui les entourent ; la quantité et la qualité de ce savoir varient selon la communauté et dépend de caractéristiques socio-économiques et socio-culturelles comme l'âge, le statut social, le sexe.. :

> *Traditional ecological knowledge is a body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. The quantity and quality of traditional environmental knowledge varies among community members, depending upon gender, age, social status, intellectual capability, and profession (hunter, spiritual leader, healer…). With its*

> *roots firmly in the past, traditional environmental knowledge is both cumulative and dynamic, building upon the experience of earlier generations and adapting to the new technological and socioeconomic changes of the present.* (Johnson, 1992, p.6)

Le savoir écologique traditionnel forme donc un ensemble de connaissances et pratiques accumulées sur un environnement précis pendant plusieurs générations : *« les savoirs locaux et autochtones comprennent les connaissances, savoir-faire et philosophie développés par des sociétés ayant une longue histoire d'interaction avec leur environnement naturel. »* (UNESCO[6]).

Néanmoins, le terme savoir écologique traditionnel (SET) a été beaucoup discuté dans la littérature scientifique : selon certains auteurs, le mot *écologique* se rapporte trop à la biologie et aux sciences (Berkes, 1993) et est donc trop restreint (Inglis, 1993), d'autres auteurs voient dans le mot *traditionnel* une vision trop statique des Autochtones (Berkes, Colding, & Folke, 2000). Ainsi, Forbes (2001) préfère parler de connaissances de la nature car cela correspond mieux à leur vision du monde. Ces connaissances sont à la fois cumulatives et dynamiques, elles s'appuient sur le savoir des générations précédentes, elles évoluent et elles s'adaptent constamment aux changements sociaux et environnementaux des sociétés (Berkes, 1993; Inglis, 1993). Cette caractéristique est également mis en avant par Berkes et al. (2000) quand il définit le savoir écologique traditionnel comme étant: *"the cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down in generations by cultural transmission, about relationships of living beings(including humans) with one another and with their environment."* (Berkes et al., 2000, p.1252).

Le SET, exprimé et transmis à travers des traditions orales (Forbes, 2001), repose sur un contexte social et culturel, et intègre les dimensions symboliques et les relations spirituelles (Armstrong, 2006; Deroche, 2008) ; il n'est pas uniforme entre tous les peuples autochtones, étant propre à chaque communauté et au contexte local (Mailhot 1993). Ce savoir regroupe des coutumes, la spiritualité et la cosmovision, dont il constitue un élément important (Deroche, 2008). La cosmovision réside dans le fait que tous les éléments sont reliés entre eux,

[6] Tiré du site : http://www.unesco.org/new/fr/natural-sciences/priority-areas/links/related-information/what-is-local-and-indigenous-knowledge/

la vie étant un ensemble, où le vivant et le non vivant sont imbriqués l'un dans l'autre, formant une toile (Deroche, 2008). Ce savoir est fondé sur l'existence d'obligations envers les êtres vivants et sa communauté, ainsi Armstrong (2006, p.35) souligne : "*I describe these things because it tells them what my responsibilities are and what my goal is. It tells them what my connection is, how I need to conduct myself […] what I must do and I can not do*". Ainsi, Berkes (2009, p.153) note qu'il y a une : « *distinction between traditional knowledge as content, information that can be passed on from one person to another, as opposed to traditional knowledge as process, a way of observing, discussing and making sense of new information—indigenous ways of knowing.*".

Comme cela a été mentionné plus haut, Le SET implique de nombreuses dimensions interreliées (Berkes, 1993; Inglis, 1993) et Berkes (2008) a proposé un schéma illustrant ces différentes dimensions et composantes; celui-ci est composé de connaissances locales, de ressources et gestion du territoire, d'institutions sociales et de la vision du monde (cosmovision), (Figure 2.1)

- Les connaissances locales sont cumulées par des observations ;

- La gestion des ressources permet d'exploiter au mieux un milieu en utilisant différentes pratiques ;

- Les institutions sociales permettent les représentations sociales ;

- La cosmovision permet la vision du monde et la compréhension de différents phénomènes.

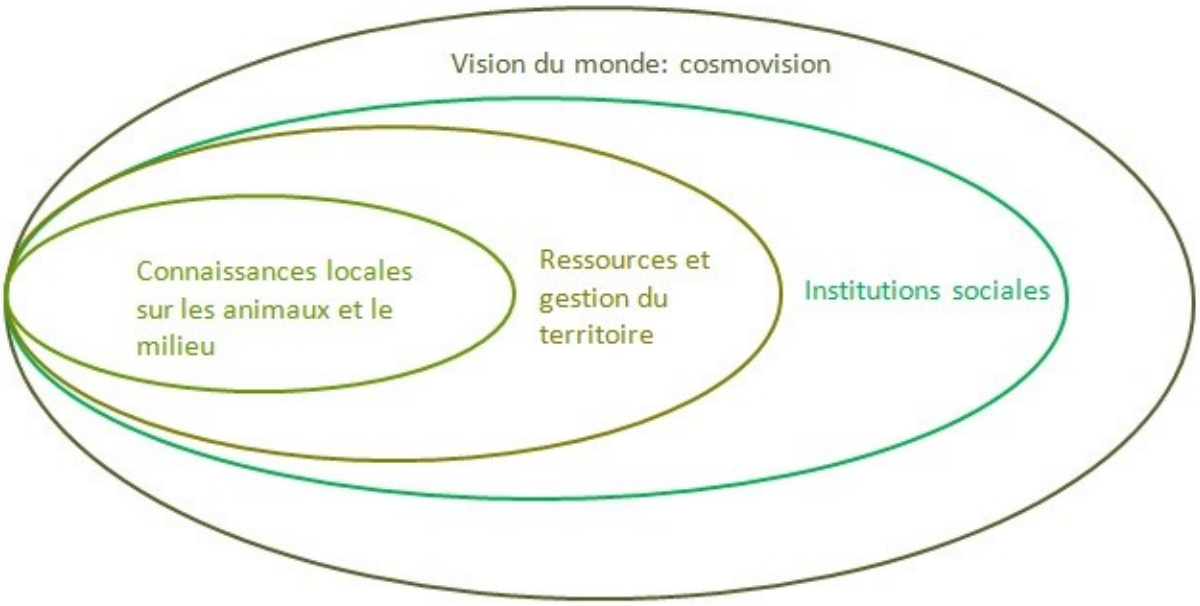

Figure 2.1: Les composantes du savoir écologique traditionnel (SET) (traduit en français de Berkes, 2008, p.17)

Dans le contexte de mon étude, je retiendrai la définition du SET selon Berkes et al. (2000) et selon l'UNESCO. Appris tout au long de la vie de l'individu à travers le territoire et les coutumes (Johnson, 1992), le savoir écologique traditionnel est indissociablement lié à la terre (Armstrong, 2006) et le Conseil mondial des peuples autochtones soulignait ce lien en 1981:

> *The land is the basis of our people's education. From time immemorial Indigenous people never had anything called 'school', each day itself was a page, each event was a lesson. Each day of one's life revealed a story, each day was a part of the learning process of life. The things our people learned were in relation to living harmony with our mother, the earth.* (WCIP, 1981).

Ce savoir traditionnel n'implique pas seulement une relation avec la terre, mais il permet aussi d'entretenir un réseau de relations entre chaque être et chaque espèce (Berkes, 2008), car comme le souligne Martin et al. (2010, p.842) en se basant sur Berkes (1998): "*Indigenous words for 'land' often refer to interrelated plants, non-human animals, and humans, as well as the physical environment."* : par exemple, on demande l'autorisation avant d'abattre un animal ou de cueillir une plante, on communique avec l'esprit (Deroche, 2008). Dans de nombreuses cultures autochtones, l'humain est une partie intégrante du système écologique (Folke, 2004) tout comme une plante ou un animal, ce que le concept autochtone "*toutes mes relations*" traduit bien (Wilson, 2008). Selon Posey (1999), il s'agit d'une véritable connexion cosmique entre les êtres humains, la terre, les esprits et tous les organismes vivants. Ce lien permet de relier le spirituel au matériel, la culture à la nature et forme une sorte de balance sacrée (Deroche, 2008). Selon Martin et al. (2010, p.842): "*A view of humans as embedded within ecosystems avoids framing the human–environment relationship as a dichotomy.".* En conséquence, il devient donc indispensable que le territoire traditionnel reste accessible à tous les autochtones afin que la communauté puisse continuer à développer ses connaissances et renouveler son savoir à travers sa culture.

L'intégration du savoir écologique traditionnel et des connaissances scientifiques pour une meilleure gestion de l'environnement

Même si le Savoir Ecologique Traditionnel (SET) présente de nombreuses similitudes avec le savoir scientifique (Mailhot, 1993), il y a des différences d'ordre philosophiques entre les deux types de savoirs que Martin et al. (2010, p.842) divisent dans trois categories interconnectées: " *(1) the relationship between humans and their environment, (2) the nature of knowledge making in space and time, and (3) the role of belief systems in knowledge-making".* Par exemple, le SET se transmet par voie orale sous forme de récits, ou de mythes et légendes ainsi que des rituels (Bird, 2005; Johnson, 1992), et il est souvent détenu par un petit groupe de personnes (Berkes, 1993). Il est aussi globalisant ; il n'y a pas de hiérarchie et il est limité géographiquement (Berkes, 1993; Johnson, 1992) tout en conservant une dimension spirituelle (Berkes, 1993; Deroche, 2008; Johnson, 1992). En ce qui concerne le savoir scientifique occidental, il est linéaire, écrit sous forme d'articles ou de rapports.

La communauté scientifique a longtemps eu tendance à considérer le savoir traditionnel comme une connaissance du monde sans valeur scientifique, et parfois même comme une collection de récits anecdotiques (Fienup- Riordan, 2001). Les deux types de savoir ont souvent été source de conflits entre les communautés autochtones et scientifiques (Henri, Gilchrist, & Peacock, 2010). Ces deux systèmes de connaissances : savoir traditionnel et savoir scientifique sont pourtant complémentaires (Mailhot, 1993), et s'expriment tous deux par la collection de données empiriques (Blanckaert, 2008) et par l'utilisation des mêmes méthodes telles que l'observation, la mise en place de différents concepts et des relations entre les organismes et leur environnement. En s'appuyant sur Borrini-Feyerabend (2004) et Berkes (2008), Berkes (2009, p.22) constate que: "*State-based scientific knowledge and community knowledge are complementary because the two kinds of knowledge operate at two distinct spatial scales, and good management requires the use of both*". L'utilisation de connaissances issues du savoir autochtone est particulièrement précieux dans le cas d'endroit isolé et peu habité comme l'Arctique où la science occidentale a commencé à compiler des données que tardivement (Gilchrist, Mallory, & Merkel, 2005). La co-production des connaissances en

combinant savoirs autochtones et occidentaux prend de plus en plus d'importance dans la recherche en Arctique (Brunet, Hickey, & Humphries, 2014; Pearce et al., 2009; voir chapitre 4).

La gestion intégrée peut permettre l'incorporation du savoir traditionnel détenu par les autochtones, aux savoirs scientifiques et ainsi permettre une meilleure compréhension des phénomènes écologiques (Berkes, 2004). Dans certains cas, le SET peut permettre une meilleure perception des problématiques de gestion, il est même indispensable (Deroche, 2008) et apporte une nouvelle vision et une nouvelle compréhension de notre environnement afin d'améliorer et de compléter les connaissances déjà acquises en matière de biodiversité. Par exemple, le savoir des Innus nous montre que non seulement ils ont des connaissances très poussées sur les espèces animales, mais qu'en plus ils ont développé une gestion écologique en lien avec leur cosmovision (Clement, 2013), dans notre recherche nous avons trouvé un résultat similaire avec les populations Dénées et Métis qui connaissent très bien le carcajou (voir chapitre 5). Ces valeurs culturelles et spirituelles liées aux éléments de la nature peuvent intervenir en faveur de la protection de la biodiversité locale (Maffi, 2005). La prise en compte des connaissances détenues par les communautés permet aussi une approche beaucoup plus sociale dans les problèmes de gestion de la faune (Henri et al., 2010) et ainsi une meilleure compréhension de la cohabitation des populations locales avec les espèces animales.

Néanmoins, dans certains cas, le SET est à prendre avec précaution, puisqu'il est local et donc difficilement généralisable d'un endroit à l'autre et d'un peuple à l'autre. Les sociétés autochtones développent leurs savoirs écologiques traditionnels sur l'observation des animaux en fonction de leurs intérêts envers ces espèces; leurs connaissances varient donc d'une espèce à l'autre en fonction de l'importance que représente, pour eux, cette espèce (Clement, 2013; Jacqmain et al, 2008). Même si le SET est parfois difficile à évaluer, il permet dans de nombreux cas d'identifier des changements au sein des populations animales, notamment leurs déclins (Huntington et al., 2011), et ainsi d'avoir les connaissances suffisantes pour pouvoir adopter la meilleure stratégie de gestion de la faune (Parlee et al, 2014).

Pour adapter les stratégies de conservation de la faune, comme le carcajou dans notre cas, il faut prendre en compte ce savoir écologique traditionnel, les valeurs et les perceptions que les sociétés autochtones détiennent envers leur milieu et le carcajou. Il faut connaitre la place de l'animal dans la culture (croyance, religion, connaissance, utilisation) et prendre en

compte les connaissances de chacun pour permettre de répondre aux attentes de ces populations dans le cadre de l'élaboration d'un projet de gestion d'espèces sensibles.

Chapitre 3 Sites d'études et espèce étudiée

Ce chapitre présente les différents sites d'études et les populations locales participant au projet. Nous présenterons les Territoires du Nord-Ouest et le Nord du Québec avec notamment le village Naskapi de Kawawachikamach et le zoo de St Félicien. Une seconde partie portant sur le carcajou, précisément ses caractéristiques physiologiques et sa répartition, son écologie, son alimentation et son statut de conservation ainsi que la perception de cet animal par les populations locales seront aussi détaillés dans ce chapitre.

3.1 Localisation des sites d'études

Plusieurs terrains d'étude ont été choisis (Figure 3.1) en fonction de la présence et absence du carcajou, ainsi que de l'accessibilité par la route/train et la présence de populations autochtones.

Les Territoires du Nord-Ouest : les communautés de Dettah, Ndilǫ et Behchokǫ̀ sont facilement accessibles hiver comme été, par la route et se situe proche de la capitale. Les villes de Fort Smith et Yellowknife sont aussi facilement accessibles en voiture. Ces sites se caractérisent pas la cohabitation du carcajou avec les populations locales autochtones.

Le Québec : La ville de Schefferville est accessible par train et le village Naskapi de Kawawachikamach par voiture de Schefferville. La communauté de Kawawachikamach a publié en 2013, un livre de contes sur le carcajou, bien que le carcajou soit absent du territoire depuis la capture du dernier individu en 1978[7]. Le zoo sauvage de St Félicien (site de conservation ex-situ) au nord du Lac St Jean est le seul zoo au Canada où un couple de carcajou captif est présenté au public.

[7] , dans la région de Schefferville (englobant le village Naskapi de Kawawachikamach)

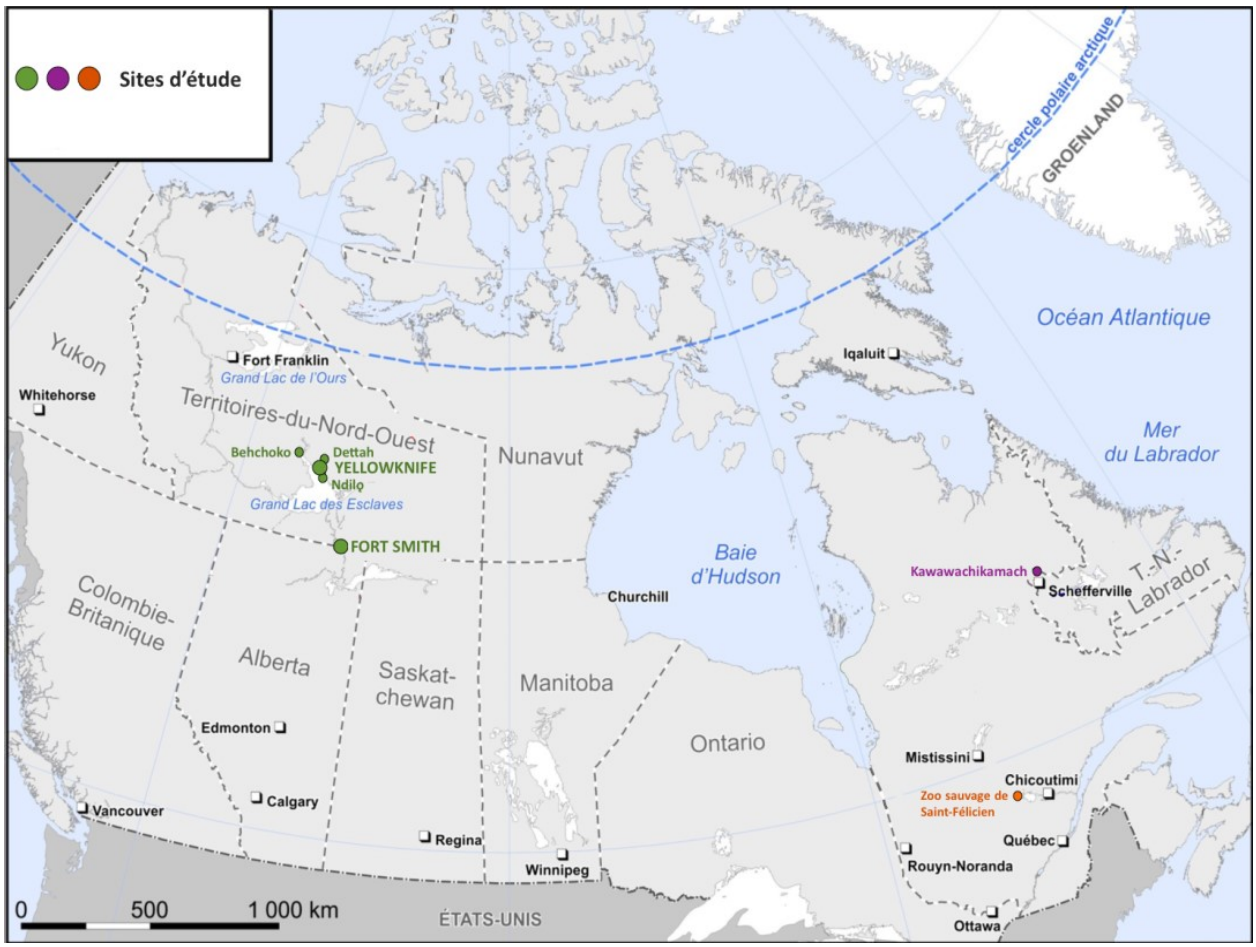

Figure 3.1: Localisation des sites d'Études (source : Marc Girard et Morgane Bonamy, département de géographie, Université de Montréal, 2019).

3.1.1 Les Territoires du Nord-Ouest

Les Territoires du Nord-Ouest (Figure 3.2) couvrent une vaste superficie de 1 346 106 km^2, et s'étendent au-dessus du 60° parallèle jusqu'au nord du cercle arctique. Le climat varie entre le Nord (climat polaire) et le Sud (climat subarctique). La majorité du territoire est recouvert de taïga et de toundra, un habitat idéal pour le carcajou (voir 3.2.2.1). Les Territoires du Nord-Ouest possèdent peu de villes et la population s'élevait à 43 500 habitants en 2013 (Statistique Canada 2013).

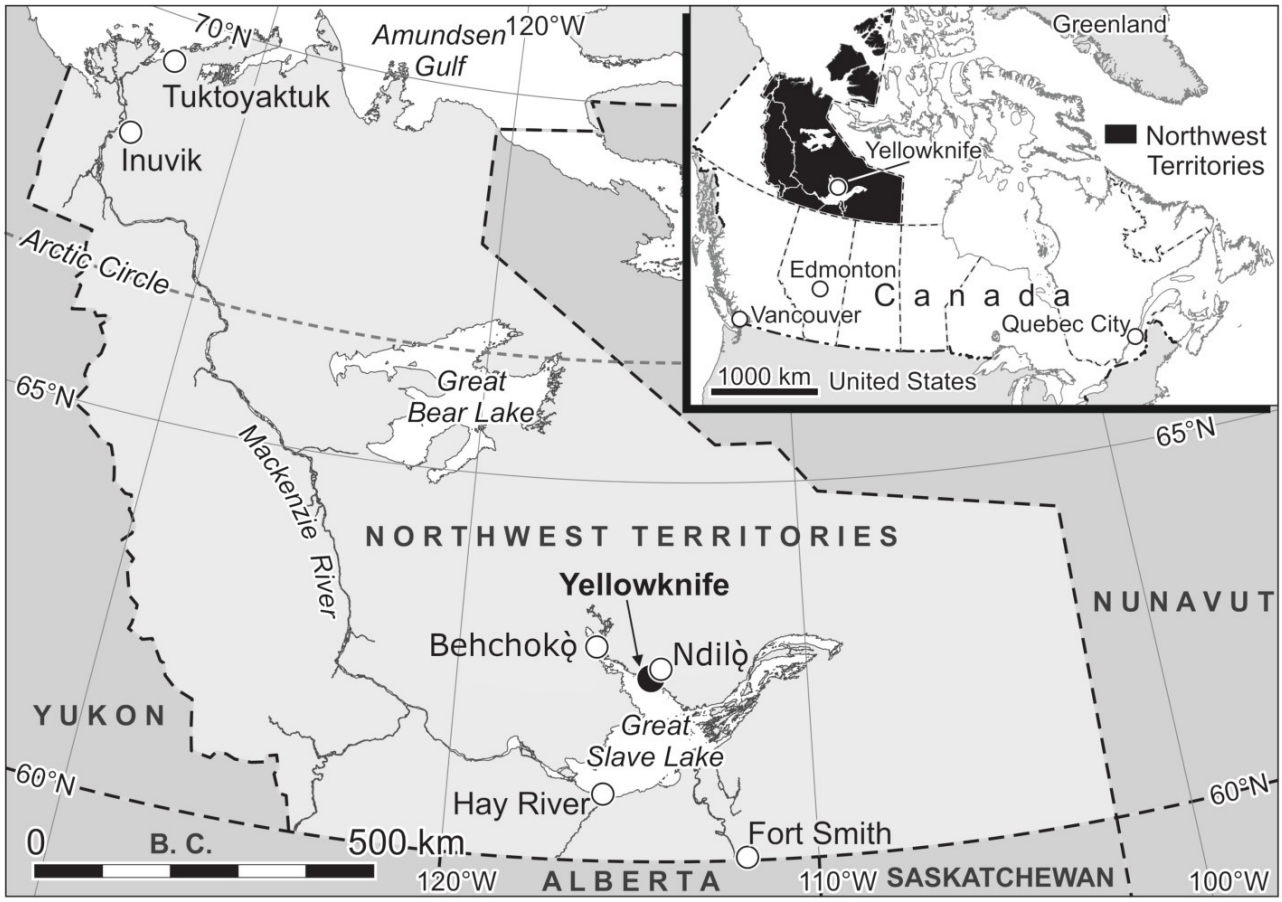

Figure 3.2: Localisation des principaux villages et villes de la région North Slave dans les Territoires du Nord-Ouest (source : Marc Girard et Morgane Bonamy, département de géographie Université de Montréal, 2019).

Les Territoires du Nord-Ouest réunissent les conditions idéales pour notre recherche sur le carcajou. En effet, avec le Yukon et le Nunavut, ils possèdent la plus grande population de carcajou du Canada (Slough, 2007) et c'est aussi une région avec une forte concentration autochtone. Sur ce territoire, les populations locales cohabitent avec le carcajou et la chasse et la trappe demeurent très présentes. Situer le terrain dans les Territoires du Nord-Ouest apparaissait donc comme une évidence puisque la recherche portait sur les interrelations humains-carcajous. En effet, ces relations ont surtout été étudiées en Europe et aux Etats Unis concernant l'élevage et l'impact du tourisme d'hiver ou des infrastructures (Goldberg, 2010; Heinemeyer et al., 2019; Mannelqvist, 2010).

En Europe, les principales interactions entre le carcajou et l'homme proviennent des animaux d'élevage et de leur prédation par ce dernier. Il en résulte de grands conflits, un mécontentement général et une perception très négative de l'espèce. Par contre, dans les Territoires du Nord-Ouest, il n'y a pas d'éleveur et les trappeurs sont peu nombreux depuis les 10 dernières années, il n'est donc pas possible de généraliser l'attitude des sociétés face à ce carnivore. Puisqu'il n'y a eu aucune étude publiée sur la perception des populations locales à l'égard du carcajou, le sentiment général de ces populations envers ce carnivore est inconnu. Dans ce contexte, étudier l'attitude et les valeurs des sociétés des Territoires du Nord-Ouest envers le carcajou pourrait permettre de comprendre la vision de ces populations.

Les communautés de la région North Slave ont été choisies en fonction de leur proximité de la ville de Yellowknife, ce qui a permis d'étudier à la fois les perceptions des populations humaines des milieux ruraux et urbains. Les populations humaines participant à l'étude sont les résidents des Territoires du Nord-Ouest (Dénés, Métis, et non Dénés) qui habitent les communautés de Yellowknife, Ndilǫ, Dettah, Behchokǫ̀ et Fort Smith (Figure 3.2). De plus l'intégration des Dénés et des Métis avec les autres populations et la présence de nombreuses communautés autochtones à proximité de Yellowknife rendaient le site particulièrement intéressant.

Yellowknife est la capitale des Territoires du Nord-Ouest situé sur la rive Nord du '*Great Slave Lake'* qui possède une population, avec une ethnicité importante, d'environ 20 000 habitants[8].

Fort Smith est une ville située sur la rivière '*Slave*' avec une population de 2500 habitants[9] composée de Métis et de Premières Nations.

Ndilǫ est une communauté Dénée touchant la ville de Yellowknife et composé d'environ 200 personnes[10].

[8] Chiffres tirés du dernier recensement statistique canada 2016

[9] Chiffres tirés du dernier recensement statistique canada 2016

[10] Chiffres tirés du dernier recensement statistique canada 2016

Dettah est une communauté Dénée située en face de la ville de Yellowknife (accessible par une route de 27 km) ou par une route de glace de 7 km traversant le lac en hiver, environ 219 personnes[11] vivent dans ce village.

Behchokǫ̀ est une communauté Dénée située au Nord de Yellowknife à 110 km et possède une petite population 1874 personnes[12].

3.1.2 Le Nord du Québec

Le Nord du Québec (Figure 3.4) ne possède plus de population de carcajou (voir chapitre 1 et 3.2.1) contrairement aux Territoires du Nord-Ouest. Cependant des populations de carcajous se trouvent au Nord-Ouest de l'Ontario, proche de la baie d'Hudson et de la frontière avec le Québec et pourrait dans les années à venir permettre le rétablissement naturel de population de carcajou au Québec (COSEPAC, 2014; Environnement Canada, 2016). En 2015, Fortin et al. (2015) a proposé un plan de rétablissement du carcajou, d'autres plans de rétablissement sont en cours et seront proposés avant 2021 (Environnement Canada, 2016). Etant donné que c'est aussi à Schefferville qu'aurait été capturé le dernier carcajou, nous avons donc choisi naturellement comme terrain le Nord du Québec (la région de Schefferville), et le zoo de St Félicien qui possède un couple de carcajou.

3.1.2.1 La Nation Naskapie de Kawawachikamach

Le dernier Carcajou a été vu en 1978 près de la région de Schefferville (Figure 3.3). Cet animal bien que 'disparu' reste néanmoins très présent dans la mémoire de nombreuses personnes et joue un rôle clé dans les légendes autochtones des Innus de la communauté de Matimekosh-Lac John (Clement, 2013) et des Naskapis de la communauté de Kawawachikamach (Peastitute, 2013).

Depuis 2000, le carcajou figure sur la liste des espèces fauniques menacées au Québec (COSEPAC, 2014). Un plan national de rétablissement du carcajou a été produit en 2005, sur les populations de l'est (Fortin et al., 2005) et un programme de rétablissement du carcajou

[11] Chiffres tirés du dernier recensement statistique canada 2016

[12] Chiffres tirés du dernier recensement statistique canada 2016

(Environnement Canada, 2016), préparé en vertu de la Loi sur les espèces en péril est en cours (COSEPAC, 2014). Il est donc particulièrement intéressant d'étudier l'attitude qu'ont les nations Innus et Naskapie envers cette espèce en vue de son éventuel retour.

Certaines communautés Innus posent des trappes pour déterminer la présence de carcajou afin d'évaluer si quelques individus seraient toujours présents dans le Nord du Québec (COSEPAC 2014). Durant les 30 dernières années, le carcajou aurait été vu par les populations locales, mais aucune donnée n'a pu être vérifiée (COSEPAC, 2014, Environnement Canada 2016). Actuellement, aucune trappe n'a révélé la présence de carcajou.

Figure 3.3: Localisation de la Nation Naskapie de Kawawachikamach (source : Marc Girard, et Morgane Bonamy, département de géographie, Université de Montréal, 2019).

3.1.2.2 Le Zoo de St Félicien

Situé dans la Région du Saguenay au Nord-Ouest du lac St Jean, et en périphérie de la ville de St Félicien au Québec, le zoo de St Félicien (Figure 3.4) est le seul zoo au Canada qui héberge un couple de carcajou (Figure 3.5, voir aussi section 3.2).

Figure 3.4: Location du zoo de St Félicien dans la province du Québec (source : Marc Girard, département de géographie Université de Montréal, 2016).

Les stratégies de conservation des espèces animales en péril ne se limitent pas seulement à la conservation in-situ, en effet, la conservation ex-situ incluant les jardins zoologiques, les parcs animaliers et les aquariums ont aussi un rôle important comme le souligne Ryder (1995, p.105): *"Zoological parks and aquaria (hereafter zoos) maintain captive collections of animals that are intentionally managed to contribute to the conservation of biological diversity."* et *" Ex situ conservation focuses on components of biological diversity"*.

Grenier (2003, p.40) note que : « *comme cette dernière [conservation in-situ] est de plus en plus difficile à assurer, et parce que la conservation ex-situ offre une visibilité plus grande pour les médias et les donateurs, elle a le vent en poupe* ». Alors qu'au début du XIX siècle, les jardins zoologiques se concentraient surtout sur l'exposition d'animaux exotiques et les divertissements, aujourd'hui leur mission est avant tout dédiée à la recherche scientifique, aux programmes de conservation ex-situ (plans d'élevage…), et à l'éducation environnementale (Ballantyne et al., 2007; Moss & Esson, 2012; Packer & Ballantyne, 2010; Patrick et al., 2007). L'Association mondiale des zoos et aquariums stipule que : « *Zoos and aquariums are the third largest founder of conservation globally"* avec *"more than 700 million people who visit zoos and aquariums every year – literally one-tenth of the world's population – to take action for the conservation of species and nature"* (WAZA)[13]. Prenant l'exemple des corrals aux tortues, un des programme de conservation ex-situ des tortues terrestres entretenue par la Fondation Charles Darwin sur les îles Galapagos, Grenier (2003, p.40) observe que : « *le corral aux tortues est la principale attraction d'une station Darwin qui est elle-même devenue, grâce à ses pensionnaires, le premier site de visite du Parc National des Galápagos, ce qui lui permet de capter les dons des visiteurs.*». Packer & Ballantyne (2010, p.25) affirment que "*Zoos are well suited […] to adult education*" faisant de ces lieux un endroit idéal pour ce type de recherche et soulignent que:

> *Most zoos and aquariums have education staff and trained volunteers who provide education programs for school groups and general visitors; animal demonstrations routinely convey education or conservation messages; and interpretation and education are an*

[13] Tiré le 26 juin 2019, de : https://www.waza.org/

> *integral part of zoo and aquarium exhibits.* (Packer & Ballantyne, 2010, p.25).

Le zoo de St Félicien ne déroge pas à la règle et propose chaque année, des camps de jours[14] en plus des différentes animations et panneaux explicatifs présents pour les visiteurs journaliers. Ce zoo fondé en 1960, a évolué aux cours des années, et aujourd'hui ce jardin zoologique de 485 ha s'intéresse exclusivement à la conservation des espèces sauvages boréales représentées par 90 espèces et environ 1000 animaux dont un couple de carcajou. La plupart des espèces sont présentes en Amérique du Nord, à l'exception de quelques-unes (macaque Japonais, grue du Japon et Tigre de l'Amour). Ce zoo se différencie des zoos traditionnels en offrant de vastes enclos avec un habitat naturel pour les animaux. Il existe deux parties distinctes dans le zoo, un sentier piétonnier de 3.7 km et une partie de 7 km, accessible en petit train, représentant les grandes régions canadiennes (plaines, montagnes, forêts…) où de nombreux animaux habitant le Canada évolue librement. Cette partie présente aussi sous forme de reconstitution historique, la vie au temps des colons, la trappe, la chasse, l'agriculture et l'élevage, ainsi qu'un centre de traite de fourrure, un camp de bucherons…. La plupart des visiteurs du zoo (90%) habitent la région du Saguenay.

Cependant, comme le notent Packer & Ballentyne (2010, p.25): "*Although conservation education is an accepted part of the mission of modern zoos and aquariums, it is not usually at the top of most visitors' 'to do' list for their day at the zoo."*. Ainsi, au vu de la méconnaissance générale du grand public envers cette espèce (voir section chapitre 1 et 3.2.1), il est particulièrement intéressant d'analyser le fait d'avoir un carcajou dans un zoo, comme celui de St-Félicien. Si la présence d'un carcajou peut contribuer à une meilleure acceptabilité de l'espèce de la part des visiteurs du zoo, elle peut également aider à promouvoir une attitude pro-conservation chez ces derniers.

[14] Les enfants sont présents sur le site pendant 5 jours consécutifs durant lesquels ils vont participer à des activités du zoo en lien avec la conservation et les animaux.

3.2 Le carcajou

> *Picture a weasel - and most of us can do that, for we have met that little demon of destruction, that small atom of insensate courage, that symbol of slaughter, sleeplessness, and tireless, incredible activity - picture that scrap of demoniac fury, multiply that mite some fifty times, and you have the likeness of a wolverine.* (Seton, 1953; p.4).

Figure 3.5: couple de carcajou (Gulo gulo) au zoo de Saint-Félicien (Crédit photo : Saint-Félicien, Canada, Morgane Bonamy, 2016).

3.2.1 Caractéristiques physiologiques et répartition géographique

Le carcajou (Figure 3.5) est un mammifère de la famille des mustélidés comme la loutre ou bien la martre. Sa fourrure est marron foncé avec de larges bandes jaunes sur les flancs (Seton, 1953). Sa queue touffue mesure entre 15 et 25 cm de long, et la longueur de son corps entre 80 et 110 cm (Banci, 1994). Il y a un léger dimorphisme sexuel chez cette espèce,

le poids des mâles varie entre 8 et 18 kg et 6 à 12 kg pour les femelles (Banci, 1994). De nombreux scientifiques ont noté que, selon l'endroit, la taille et le poids du carcajou pouvaient varier considérablement. Selon la latitude Nord - Sud, il y aurait une diminution de la taille de l'espèce (Copeland, 1996).

Sa tête est ronde et large (Banci, 1994) et chaque individu possède une répartition de zone de coloration unique ce qui permettrait de les distinguer individuellement (Pasitschniak-Arts & Larivière, 1995). Son crâne et sa mâchoire extrêmement robuste, lui permettent de broyer les os des animaux morts gelés dont il va se nourrir (Banci, 1994; COSEPAC, 2014).

La morphologie du carcajou en fait une espèce adaptée au froid, puisque ses larges pieds lui permettent de se déplacer assez facilement dans la neige profonde (Inman, 2013; Khalil, Pasanen-Mortensen, & Elmhagen, 2014), il possède aussi des griffes semi-rétractiles qui lui servent à grimper aux arbres (Banci, 1994; Pasitschniak-Arts & Larivière, 1995).

L'aire de répartition de cette espèce est circumpolaire (Banci, 1994; Ruggiero et al., 2007). On le retrouve en Russie, Asie, Amérique du Nord et Scandinavie là où la neige est persistante au sol (Figure 3.6).

Historiquement le carcajou était présent sur tout le territoire canadien (Figure 3.7), mais actuellement le carcajou semble avoir disparu de l'Est du Canada (Fortin et al., 2005; COSEPAC 2014, Environnement Canada, 2016) et des populations éparses sont présentes à l'ouest du Canada.

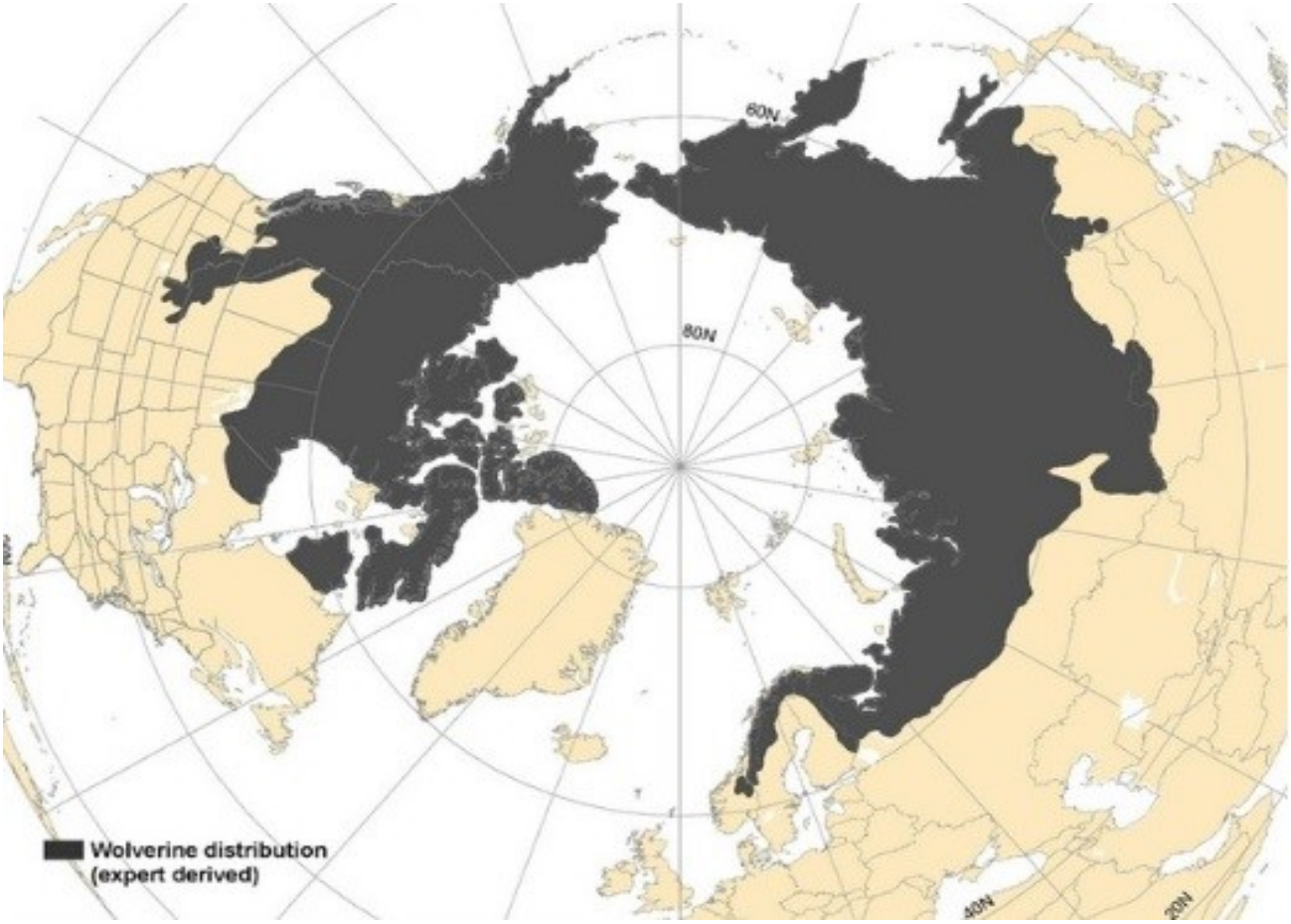

Figure 3.6: Carte de la répartition mondiale du carcajou en 2011 (Source : The Wolverine fundation inc, 2011[15]).

[15] Tiré de : http://wolverinefoundation.org/wp-content/uploads/2011/02/Worldwide_dist_polar.pdf

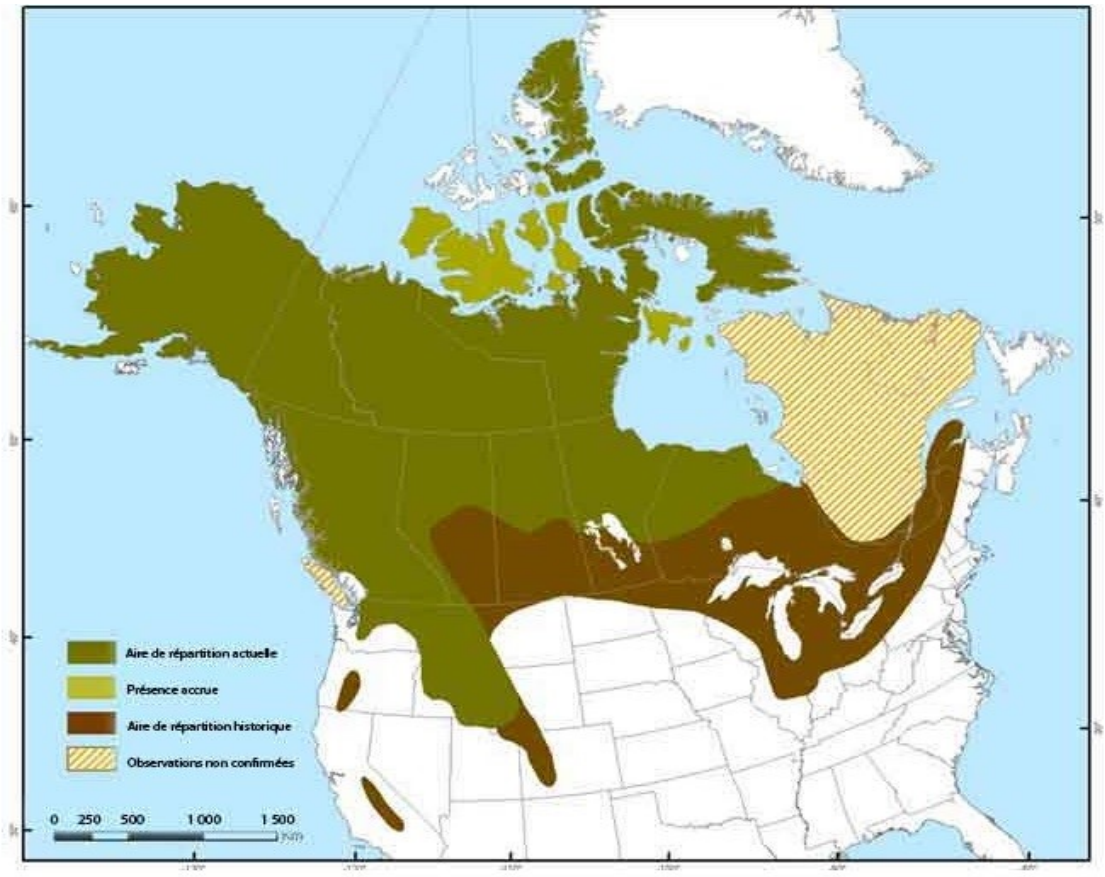

Figure 3.7: Répartition nord-américaine du Carcajou en 2014 (Source : Environnement Canada[16]).

Malgré l'absence du carcajou depuis plus de 40 ans, quelques observations de carcajous ont été répertoriées, mais elles n'ont pas été confirmées ou validées et il n'y a eu aucune observation directe (Communication personnelle d'Isabelle Thibault et Sophie Gallais 2015), malgré tous les efforts de détection de carcajou déployés (stations de détection depuis 2010 et survol aérien de 100 000 km2) aucun individu n'a encore été détecté (Environnement Canada, 2016).

Néanmoins, étant donné la superficie de la province du Québec et la difficulté à détecter le carcajou en raison de sa faible densité et de son comportement, il convient donc d'être prudent

[16] Tiré de : https://www.registrelep-sararegistry.gc.ca/default.asp?lang=Fr&n=6A5DE14A-1#_02_2

avant d'affirmer l'espèce éteinte (Environnement Canada, 2016), à ce propos, une carte (Figure 3.8) a été proposée pour évaluer la répartition de ces données (COSEPAC, 2014).

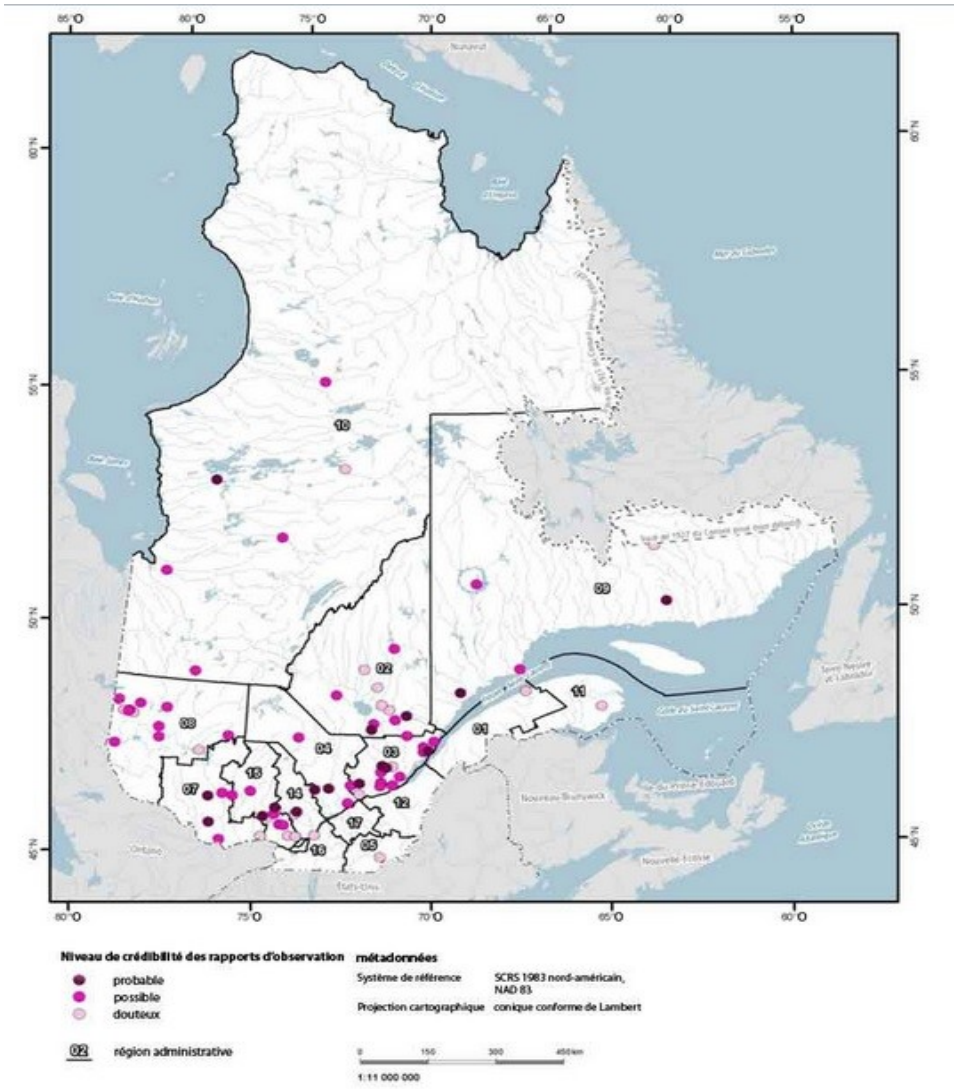

Figure 3.8: Emplacements d'observations de Carcajou au Québec, 2000 à 2012 (Source : Environnement Canada[17]).

[17] Tiré de : https://www.registrelep-sararegistry.gc.ca/default.asp?lang=Fr&n=6A5DE14A-1#_02_2

3.2.2 Écologie

3.2.2.1 Habitat

Le carcajou préfère les régions éloignées à l'écart des activités humaines (Weaver, Paquet, & Ruggiero, 1996) et il est surtout présent là où il y a eu peu de transformation du paysage (Banci, 1994; Copeland, 1996). On peut le retrouver dans une grande diversité d'habitats : de la forêt boréale et la taïga (dominé par l'épinette noire (*Picea mariana*), l'épinette blanche (*Picea glauca*), le pin gris *(*Pinus banksiana), le mélèze laricin (*Larix laricina*,) le sapin subalpin (*Subalpine Fir)* et le bouleau blanc (Betula papyrifera) à la toundra arctique ou bien encore dans les zones montagneuses (Banci, 1994).

3.2.2.2 Domaine vital, mouvement et activité et densité des populations

Les domaines vitaux des carcajous sont très grands : le territoire de cet animal peut s'étendre jusqu'à 1366 km² (Lofroth, 2001). Les mâles ont des domaines vitaux plus larges que les femelles (Banci, 1994). La superficie du domaine vital d'un mâle varie d'un endroit à l'autre, il peut être de 382 km² au Yukon (Banci, 1981) à 666 km² en Alaska (Lewis & Barten, 2008), et 763 km² en Scandinavie tandis que pour la femelle, il est en moyenne de 335 km² (Landa et al., 1998).

La taille du domaine vital se fait en fonction de l'habitat, de la nourriture disponible, de la topographie et de la saison (Banci, 1994; Banci & Harestad, 1990). Le carcajou, plutôt nocturne, mais pouvant avoir des périodes d'activités pendant le jour, se déplacerait en moyenne de 12 km par jour en utilisant en général le même chemin et en se déplaçant en ligne droite (Rausch & Pearson, 1972) ; mais il est tout à fait capable de parcourir 30 à 40 km par jour (Banci, 1994). En effet, les carcajous passeraient beaucoup plus de temps à suivre les traces d'autres carnivores plutôt qu'à traquer des proies. Les mouvements et les déplacements seraient aussi affectés par les saisons (Landa et al., 1998), mais la topographie comme les chaînes montagneuses, les rivières ou les lacs ne sembleraient pas empêcher les mouvements des carcajous (Banci, 1994; Hornocker & Hash, 1981).

La densité des populations de carcajou est extrêmement basse comparée à celle d'autres carnivores (Banci, 1994; Inman et al., 2012). La densité est d'environ 1/200 km² en Alaska (Banci, 1994), 1/177 km² au Yukon (Banci & Harestad, 1990), 1/207 en Colombie-

Britannique (Quick, 1952) et 1/65 au Montana (Hornocker & Hash, 1981). Les densités les plus basses de carcajou ont été observées en Scandinavie, ou on peut trouver de 1/200 km² à un individu pour 500 km² (Persson et al., 2009), tandis qu'on trouve en Sibérie les plus fortes densités 1/50 km² à 1/250 km² (Pasitschniak-Arts & Larivière, 1995).

Les carcajous ont peu de prédateurs : les loups et les humains qui peuvent néanmoins contribués au déclin de populations de carcajous où à leur disparition d'un territoire (Fortin, 2005).

3.2.3 Alimentation

Le carcajou est un carnivore, opportuniste qui préfère les carcasses d'animaux morts (Banci, 1994), tués par d'autres prédateurs (comme les loups) ou morts dans des avalanches ; mais il est tout à fait capable de tuer ses propres proies (rongeurs, oiseaux…), (Persson, 2003). Il peut s'attaquer à de grosses proies comme le caribou (Banci, 1994; Persson, 2003), mais son régime alimentaire est surtout constitué de ce qu'il va trouver (Banci, 1994). Ainsi, durant l'hiver, les ongulés vont constituer la source principale de sa nourriture (Inman et al., 2012; Mattison, 2011; Van Dijk et al., 2008), tandis qu'en été, il peut se nourrir de nombreuses baies et larves de guêpes (Pasitschniak-Arts & Larivière, 1995), de petits rongeurs (Dalerum et al., 2009) et d'œufs d'oiseaux (Myhre & Myrberget, 1975).

Dans les Territoires du Nord-Ouest, sa nourriture principale est constituée de caribou, de spermophile arctique et des lemmings (Mulders, 2001). Le récent déclin des populations de caribous pourrait affecter la dynamique du carcajou dans cette région (Gunn, Russell, & Eamer, 2010). La présence d'autres carnivores pourrait aussi augmenter la disponibilité de la nourriture en terme de carcasse, (Koskela et al., 2013; Mattison, 2011; Van Dijk et al., 2008), la distribution du carcajou pourrait donc être liée à celle des loups ou des lynx (Khalil et al., 2014).

Les carcajous ont aussi la particularité d'utiliser des caches de nourriture dans des trous creusés dans le sol, dans des arbres et/ou sous des congères (Banci, 1994; Pasitschniak-Arts & Larivière, 1995).

3.2.4 Statut de conservation du carcajou

Le statut de protection du carcajou est complexe étant donné sa large distribution. Les populations de carcajou de l'est (Québec et Labrador) sont considérées en voie de disparition depuis 2005 (Annexe 1 de la Loi sur les espèces en péril (LEP))[18]. En 2014, COSEPAC a désigné le carcajou « espèce préoccupante » sur l'ensemble du territoire Canadien, considérant désormais le carcajou comme une seule population. (Environnement Canada, 2016).

3.2.5 Perception du carcajou par les sociétés locales et le rôle de l'animal dans les cultures autochtones

> *The wolverine is one of the most detested animals found in all the fur country. Its life is a continual warfare against all living things, and every man's hand is against it. They invariability steal the bait from traps whenever they have the opportunity, and very rarely do they get caught. Should they find an animal in the trap, they make short work of it, and in northern Alaska, as elsewhere in the fur country, they sometimes take up a line of traps so persistently that the hunter is forced to abandon it and look for a new route.* (Seton, 1953, p.3)

Dans la littérature, le carcajou est connu sous différents noms, comme « le glouton » en raison de sa voracité ou alors démon du nord, « démon de Tasmanie des forêts canadiennes » ou bien encore « diable des bois » (Banci, 1994; Moore & Wheelock, 1990; Savard, 1971; Seton, 1953). Il a été souvent décrit comme un monstre sanguinaire ou la créature la plus féroce sur terre (Thibault et al., 2013) capable de voler la nourriture (Seton, 1953) et même de défier des animaux plus gros que lui comme les grizzlis (voir chapitre 5, section 5.3.1.4). En fait, c'est son régime alimentaire lié aux charognes et à l'environnement très difficile dans lequel il vit qui ont fait sa réputation. En ajoutant, le fait que les carcajous soient peu connus, rarement vus, souvent confondus avec d'autres espèces animales et considérés comme nuisibles par les trappeurs, il n'est pas difficile de comprendre d'où lui vient sa mauvaise réputation.

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[18] « *En 2014, le COSEPAC a déterminé que l'espèce était constituée d'une seule population et l'a désignée comme étant « espèce préoccupante* » (Environnement Canada, 2016, p.iv).

Le carcajou a la réputation d'être un animal féroce, agressif, ou encore diabolique, même si son comportement s'apparente à celui des autres mustélidés (Fortin et al., 2005; Hash, 1987). Il est peu apprécié du public à cause de certains traits de comportement; l'une de ces principales caractéristiques serait d'être capable de subtiliser l'appât d'un piège sans se faire prendre (Seton, 1953). Cette perception est encore bien présente aujourd'hui, pourtant, le carcajou n'a jamais été une menace directe pour l'humain (voir chapitre 5, section 5.3.3) puisqu'aucune attaque humaine n'a été rapportée à ce jour (Thibault et al., 2013) contrairement à d'autres grands carnivores comme l'ours[19] ou le couguar[20].

Le carcajou est un animal très présent dans de nombreux mythes autochtones mettant en relation les humains et le monde surnaturel et il permet une interprétation de la place de chacun (Moore and Wheelock 1990, Millman 1993, Peastitute 2013). Il peut être un personnage humoristique, un gourmand, un malin aimant jouer des tours vicieux et/ou méchant (Peastitute 2013). Un grand nombre de récits autochtones, font référence au carcajou comme un animal perturbant la vie des autres animaux et jouant de méchants tours (Millman, 1993; Moore & Wheelock, 1990; Peastitute, 2013; Savard, 1971). Son apparition dans ces histoires orales contribuent, bien souvent, a donner de lui une image malicieuse, ce qui induit le scepticisme, voir le refus par certaines communautés de la conception et de la mise en œuvre de projets de conservation ainsi qu'une forte opposition à la réintroduction ou réhabilitation de cet animal menacé. Si le carcajou est vu comme un ennemi redoutable en raison de son caractère vicieux et destructeur ; cette espèce est en même temps très respectée pour sa force et son intelligence, et plusieurs communautés attribuent au carcajou des pouvoirs de guérison et de transformation (Bonamy et al., 2019; Moore & Wheelock, 1990; Savard, 1971). Par exemple, dans la culture Dénée, à l'origine, le carcajou était un homme qui ne voulait pas travailler et qui a donc choisi de prendre l'apparence du carcajou (voir chapitre 5, section 5.3.1.5). De nombreuses légendes sur le carcajou sont répertoriées dans un recueil de contes Dénés (Moore & Wheelock, 1990) où l'animal a une apparence de bête, mais avec des attributs humains et est considéré comme un *trickster* (voir chapitre 5, section 5.3.1.5),

[19] https://www.thecanadianencyclopedia.ca/fr/article/ours-attaques-par-les

[20] https://ici.radio-canada.ca/nouvelle/1102205/cougar-attaque-mort-homme-etat-washington

personnage mythique qui a une grande importance que cela soit dans la création du monde (Carroll, 2004; Savard, 1971), l'origine des cultures (Lévi-Strauss, 1955), ou bien le rôle de héro (Ricketts, 1966). Selon Legge et Robinson (2017, p.3), *"First Nations oral knowledge portray animals as thinking, talking, and living much as humans do*", tout comme Absolon (2016) qui note que les humains et les animaux sont interconnectés dans la cosmologie autochtone.

Comme il a été dit précédemment, la fourrure du carcajou demeure très prisée par les Inuits et les Dénés qui l'utilisent comme bordure et doublure de vêtements, car le givre n'adhère pas à sa surface (voir chapitre 5, section 5.3.1.1; Thibault et al., 2013). Bien que beaucoup moins chassé ou piégé de nos jours, la fourrure de carcajou reste quand même présente sur les marchés et se vend relativement bien (Communication personnelle de Roussown 2014, voir chapitre 5, section 5.3.1.1).

Chapitre 4 Méthodologie, Considérations éthiques et place du chercheur en contexte autochtone

Je partage ci-dessous mes réflexions écrites dans mon carnet, lors de mes terrains dans les Territoires du Nord-Ouest, à la suite de ma dernière visite à Yellowknife en 2016.

Ce n'était pas la première fois que j'allais dans une communauté autochtone, mais dans le cadre d'un travail au sein de la communauté, c'était nouveau et je n'étais pas très à l'aise. Se présenter au conseil et expliquer son projet, en personne, cela requiert un peu plus de confiance en soi, que par email ou téléphone. J'avais rendez-vous au band office de Ndilǫ, je me suis présentée à l'heure dite et ce jour-là, j'ai attendu longtemps, et puis au bout de quelques heures, le chef ne venant pas, j'ai pris un « autre rendez-vous » pour le lendemain et je suis partie. J'étais dépitée, déprimée et je me suis dit que je n'arriverais jamais à mettre en place mon projet de recherche.

Puis, je suis allée au conseil de la Nation Dénée à Yellowknife et j'ai rencontré Camilla Zoé Chocolate. qui occupait le poste de directeur (Director, Lands & Environment), après avoir été biologiste dans les mines, travail très intense et difficile avec une famille et 2 enfants (2 semaines de travail au milieu de la toundra, 12h/jour suivi de 2 semaines de repos). Camilla m'a beaucoup aidé, elle m'a mis en contact avec d'autres membres de la Nation, a fait un poster pour la présentation de ma recherche et a imprimé des flyers que je pouvais laisser au conseil de bande à Ndilǫ. Tout en me donnant une liste de personnes à contacter de sa part.

J'ai aussi compris qu'il n'y avait pas de ligne de temps, pas d'emploi du temps fixe. Le temps passe et évolue selon le moment et le contexte et non pas selon les rendez-vous écrits dans un agenda. J'ai trouvé cela très dur de ne pas se fixer de contrainte, de temps ou de limite, mais j'ai compris que le chercheur doit s'adapter au milieu autochtone et non l'inverse.

J'étais là pour un peu moins de 2 mois et lors de ce premier terrain, je n'ai fait qu'une seule entrevue.

Je suis revenue quelques mois plus tard, à la demande de la Nation Dénée, pour présenter de façon vulgarisé les impacts du réchauffement climatique sur les sociétés nordiques et mon projet sur le carcajou. J'ai été invitée à Whati pour participer aux fêtes, aux danses, et à la pêche. Je suis restée quelques jours dans la communauté et c'est là que j'ai pris conscience que ma recherche n'était pas une recherche 'sur la perception' des autochtones, mais une recherche participative, 'avec' les autochtones, un échange d'informations sur nos connaissances communes envers le carcajou.

Beaucoup de personnes que j'ai rencontrées dans la communauté et qui m'ont accueilli m'ont posé beaucoup de questions sur l'Europe, comment ça se passe là-bas, avec la chasse, les quotas, mais aussi le réchauffement climatique. Beaucoup m'ont cité les noms de français qu'ils connaissaient et que bien évidemment je ne connaissais pas. Pendant ces quelques jours je n'ai interviewé personne, sentant que ce n'était pas le moment propice. Je voulais juste écouter et participer aux activités de la communauté, j'ai compris que le plus important pour moi était d'être acceptée par la communauté.

Lors de mes 2 premiers terrains, j'ai parlé avec beaucoup de monde au sein des différentes communautés (Dettah, Ndilǫ, Whati, Behchokǫ̀, la mine de Diavik et à la station de recherche de Daring Lake), nous avons eu beaucoup d'échanges concernant le carcajou mais je n'ai collecté que très peu d'entrevues formelles. J'ai décidé de ne publier que ces entrevues formelles et non pas le contenu de mes diverses discussions avec les locaux. Pourquoi ? C'était la règle que je m'étais fixée, celle avec laquelle je me sentais la plus à l'aise en tant que chercheuse et parce que cela correspondait aux demandes de mes deux permis éthiques rattachés à mon projet.

Lors de ces moments d'échanges informels, je n'ai pas pris de note, et je ne peux pas retranscrire mot pour mot ce qu'on m'a dit, je n'ai pas envie de paraphraser ces moments uniques et si riches, qui s'apparentaient plus à une discussion entre amis. Il aurait fallu que je sorte mon stylo, que je leur fasse signer le consentement de participation à cette recherche ou que je leur demande verbalement. J'aurais dû aussi leur expliquer que notre conversation pourrait être utilisée dans le cadre de mon projet. Tout cela aurait pu mettre fin à notre échange verbal, j'ai donc préféré continuer à les écouter, pour enrichir mes connaissances personnelles sur leurs coutumes, traditions, leurs vies, leurs relations avec le carcajou, là-bas, dans le Nord. Pour me sentir vraiment à l'aise, il m'aurait fallu plus de temps pour lier

des amitiés, pour parler de mon projet, pour pouvoir redessiner mon étude et laisser encore plus de place à leurs idées, leurs suggestions. Intégrer une étude sur les caribous était l'un de leur souhait….

Je reviens pour la dernière fois cette année, pour enfin pouvoir parler du Carcajou aux membres de la Nation Dénée et réaliser mes entrevues. Espérant pouvoir de nouveau discuter, échanger et enfin collecter les données de ma thèse…

Mon éthique de recherche repose sur une participation des populations locales et se base sur une relation de confiance entre moi chercheuse non autochtone et les habitants de ces communautés. Cette approche est donc une condition essentielle à la recherche en milieu autochtone et cette relation de confiance n'est possible qu'à travers un partage et un échange d'informations entre le chercheur et les populations locales. La richesse de cette mise en commun d'informations va façonner la qualité du projet et va lui donner une légitimité avec un but commun : mieux vivre ensemble avec ces espèces animales et arriver à une solution durable pour éviter leur disparition.

Notre place dans cette recherche en contexte autochtone

La recherche sur la conservation des espèces animales sauvages a beaucoup évolué ces dernières décennies, et désormais la plupart des chercheurs travaillant sur les relations humanimales préconisent une intégration des populations locales, que cela soit dans la participation des sociétés locales ou dans l'intégration des savoirs locaux (Brunet, Hickey, & Humphries, 2016; Castleden, Morgan, & Lamb, 2012; DeLeeuw, Cameron, & Greenwood, 2012; Henri et al., 2010; Maffi, 2005; Parlee et al., 2014). Dans l'Arctique canadien, les recherches participatives où les chercheurs universitaires allochtones et les communautés autochtones travaillent ensemble, comme collaborateurs dans un processus de co-production de connaissances, créent des ponts entre les savoirs autochtones et occidentaux (Chanteloup, 2013; Davidson-Hunt & O'Flaherty, 2007; Pearce et al., 2009). Il est important de bien poser les bases de notre relation en matière de recherche en contexte autochtone, il faut une relation de confiance et non pas une relation de pouvoir. Ce n'est qu'en surmontant les barrières de pouvoir et en créant une relation horizontale d'égale à égale qu'une recherche respectueuse

pourra se faire et que la collaboration sera fructueuse et productive (Huntington et al., 2011). Selon (Davidson-Hunt & O'Flaherty, 2007, p.295) :

> *Research on indigenous knowledge has suggested that inclusion of indigenous knowledge products in resource management is not a solution; rather, we need to reframe the problem so that new approaches consider how to create knowledge-producing processes that include both indigenous people and researchers as agents working on mutually agreed upon goals.*"

De la même manière, Castleden et al. (2012, p.162) ont souligné que la recherche participative axée sur la communauté "*is not a research method per se, it is a process by which decision-making power and ownership is shared between the researcher and the community involved".* Ces démarches collaboratives en matière de recherche sont nécessaires pour promouvoir ce que Tuhiwai-Smith (2012) appelle la «*décolonisation de la recherche*». Plusieurs auteurs, dont Brunet et al. (2016), parlent d'un nouveau paradigme de la recherche en Arctique qui a vu le jour: "*[…] new northern research paradigm, associated with ensuring partnership, mutual benefits for research stakeholders and the empowerment of local researchers".* (Brunet et al., 2016, p.345-346).

Quelle est la place du chercheur dans cette recherche ? Comment avec un bagage culturel différent arrive-t-on à faire une recherche de terrain en collaboration avec des populations autochtones? Comment aborder cette recherche en étant un chercheur scientifique non autochtone au milieu d'une communauté autochtone. DeLeeuw et al. (2012) donne une définition juste de la recherche avec les peuples autochtones, qui :

> *[…] emphasizes social justice, political engagement, non-hierarchical relations, and process-based practice […] a frame- work that emphasizes redressing power imbalances between researchers (generally academic) and research subjects (generally non-academic), […] It involves collaborative approaches that rely on negotiations and allow for mutual benefit to all involved.* (DeLeeuw et al., 2012, p.184)

Cette définition de De Leeuw et al., correspond bien à ce que je souhaitais faire dans mon étude, à savoir créer un partenariat avec les communautés. Comme le disent si bien Castleden et al (2012, p.166) *"Partnership approaches informed by community collaboration is clearly necessary as demonstrated in the evolving ethical guidelines of the past two decades*". Cependant la recherche en contexte autochtone est encore en évolution, et il reste des efforts à

faire pour arriver à une vraie intégration des populations locales dans la démarche scientifique: "*Local people are becoming more involved in Arctic science, but the nature and level of this involvement remain limited and vary systematically among disciplines, organizations, and regions"*(Brunet et al., 2014, p.69).

4.1 Terrain dans les Territoires du Nord-Ouest

Un certificat d'éthique a été demandé au Comité d'Éthique de la Recherche de la Faculté des Arts et des Sciences (CERFAS, 2013-14-201-D) et obtenu le 13 février 2014 (Annexe 7). Un second permis d'éthique a été demandé au Aurora College, lors de la demande de ce permis, les communautés visées par le projet ont été contactées et ont donné leur accord pour les entrevues des adultes et les ateliers scolaires dans les écoles. Ce permis (licence numero : 15456) a été accordé par l'Aurora College le 10 avril 2014 (Annexe 8).

En plus des permis obtenus par l'Aurora College et le CERFAS, avant de commencer le remplissage des questionnaires et la réalisation des entrevues avec les populations des communautés de la région North Slave, ce projet a été préalablement présenté aux résidents locaux en 2014. Lors de sa présentation, le projet a été bien accueilli, validé et approuvé par la Nation Dénée et les différentes communautés autochtones approchées.

Pour les participants adultes de communautés de Ndilǫ, et Dettah, les entrevues ont eu lieu dans les locaux de la Nation Dénée. Avant le début de chaque entrevue, le projet a été présenté individuellement à chaque participant et un consentement écrit a été obtenu. Pour les entrevues à Fort Smith, un consentement verbal a été obtenu après la présentation du projet et avant le début de l'entrevue. Les participants ont été rémunérés pour chaque entrevue en guise de reconnaissance pour avoir partagé leurs savoirs sur le carcajou et pour les dédommager et les remercier pour leur temps accordé à l'étude.

Pour les jeunes, les questionnaires et les dessins ont été réalisés au sein des écoles avec la présence des professeurs. Le consentement a été stipulé par écrit par les directeurs des écoles et les professeurs des classes concernées. Un consentement verbal a aussi été obtenu par les jeunes qui étaient libres de participer ou pas au projet.

4.2 Terrain à Kawawachikamach

Au certificat d'éthique obtenu par le Comité d'Éthique de la Recherche de la Faculté des Arts et des Sciences (CERFAS, 2013-14-201-D) en 13 février 2014, une mention pour les aires d'études (Nation Naskapie de Kawawachikamach et Zoo de St Félicien) a été rajouté en 2016. De plus, en 2016, le projet de soumettre des questionnaires aux enfants, et de collecter des dessins a été proposé au conseil de la Nation de la communauté Naskapie et accepté par la Nation le 8 avril 2016. Sandy Shecanapish (Deputy Chief and Cultural Skills Animator) a été mandaté par la Nation Naskapie pour aider dans la collecte des données (questionnaires + dessins). Un membre de la Naskapi Development Corporation a aussi été mandaté pour assister à la réalisation de cette recherche. Le projet a été intégré dans le camp de jour, et les données ont été collectées dans le cadre du camp de jour Naskapi avec le consentement verbal de la directrice du camp. Chaque jeune a eu le choix de participer ou pas à l'étude, et le consentement verbal de chaque jeune participant a été obtenu.

4.3 Terrain au Zoo de St Félicien

Le projet de recherche sur le carcajou a été proposé au Zoo de St Félicien en 2016 et a été validé par Christine Gagnon, la directrice scientifique et pédagogique du Zoo de St Félicien qui a signé le consentement éthique du projet.

Pour les adultes, visiteurs du zoo, le consentement verbal de chaque personne a été obtenu lors de la présentation individuelle du projet et avant la collecte de donnée des questionnaires.

Pour les jeunes, les questionnaires sur le carcajou ont été distribués au sein du camp de jour sous l'autorité du Zoo de St Félicien qui a incorporé ce projet sur le carcajou dans son propre projet de camp de jour. Chaque jeune a eu le choix de participer ou pas à cette étude, et un consentement verbal a été obtenu pour chaque participant.

4.4 Méthodologie utilisées en fonction des objectifs

Objectifs	**Participants**	**Données collectées**	**Analyses**
1- Caractériser les connaissances et les valeurs,	Dénés et Métis des Territoires du Nord-	15 entrevues et 12 questionnaires	Analyse sémantique,

les attitudes, les usages, et la motivation des populations locales (chapitre 5)	Ouest (Fort Smith, Ndilǫ et Dettah)		lexicale et thématique
2- Comparer le degré de connaissance et la perception que les jeunes ont sur le carcajou (chapitre 6)	Enfants de 8 à 12 ans des Territoires du Nord-Ouest (Yellowknife, Ndilǫ, Behchokǫ̀)	151 questionnaires	Modèles statistiques, analyse sémantique
3- Identifier les représentations sociales du carcajou chez les jeunes (chapitre 7)	Enfants de 8 à 12 ans des Territoires du Nord-Ouest (Yellowknife, Ndilǫ, Behchokǫ̀) et du nord du Québec (*Kawawachikamach*)	165 dessins et 23 entrevues (8 entrevues* de membres de la nation Dénée (NWT) et 15 entrevues de membres de la nation Naskapis (QC)	Modèles statistiques, analyse picturale
4- Évaluer le rôle de la conservation ex-situ sur le degré de connaissance et la motivation des populations envers la conservation du carcajou. (chapitre 8)	Visiteurs adultes du zoo de St Félicien (Québec) et enfants de 8 à 13 ans d'un camp nature de 5 jours (Québec)	170 questionnaires adultes et 118 questionnaires enfants	Modèles statistiques, analyse lexicale et sémantique

* les entrevues Dénées utilisées pour l'objectif 3 proviennent de la collecte de donnée de l'objectif 1.

4.5 Limite de la recherche

Cette recherche possède aussi quelques limites et contraintes. D'abord, les questionnaires et interviews ont été proposés sur la base du volontariat, ce qui fait que toute la

population n'a pas pu être représentée. La difficulté à trouver des participants intéressés par cette recherche sur le carcajou et le coût lié aux entrevues et questionnaires n'ont malheureusement pas permis d'échantillonner un plus grand nombre de participants adultes. Notre étude, arrivant au moment des tensions entre le gouvernement et les Territoires du Nord-Ouest au sujet de la chasse et des permis, n'a pas favorisé le dialogue. Un évènement tragique (la disparition de deux jeunes adolescents) est survenu quelques jours avant mon dernier terrain à Ndilǫ, et lorsque je suis arrivée, la plupart des chasseurs effectuaient des recherches dans les bois pour essayer de les retrouver. Ce qui a considérablement limité le nombre de personnes que j'ai pu contacter.

Le recours à un traducteur n'a pas toujours été réalisable, et même avec une traduction, il est possible que certains mots ne traduisent pas exactement le sens voulu, même si une attention particulière a été apportée lors de la transcription.

Il n'est pas toujours aisé de travailler avec les enfants et parfois, ils veulent tellement faire plaisir qu'ils ont tendance à donner des réponses susceptibles de plaire aux adultes. Nous avons donc été vigilants pour ne pas les orienter dans leurs réponses et ne pas leur montrer nos sentiments vis-à-vis de l'espèce étudiée. Tous les enfants n'étaient pas au même niveau lexical, et certains avaient du mal à s'exprimer à l'écrit, nous avons donc adapté notre langage au contexte et fait attention au vocabulaire employé et c'est une des raisons pour lesquelles nous avons utilisé des images et des dessins. Dans beaucoup de cas, (avec les plus jeunes enfants et ceux qui avaient de la difficulté à écrire), avec le professeur nous les avons interrogés individuellement à l'oral afin de transcrire au plus près ce qu'ils pensaient.

Dans le cadre de notre recherche, nous avons choisis de définir les catégories de valeurs au départ ce qui permettait des questions courtes et précises. Mais cela a aussi limité la recherche, puisque l'expression d'autres valeurs n'a pas pu être exprimée ou être prise en compte. Nous avons choisi cette méthodologie car cela permettait d'avoir des résultats facilement exploitables et de raccourcir considérablement les questionnaires (notamment pour les enfants et les visiteurs du zoo[21]). Afin de pallier à ce problème de limitation, nous avons couplés les questionnaires à des entrevues avec les populations Dénées et Métis ce qui nous a

[21] Voir le paragraphe suivant pour les contraintes de questionnaire pour les visiteurs du zoo et les enfants.

permis de développer plusieurs questions et d'autres valeurs. Malheureusement pour les enfants et les visiteurs du zoo, nous n'avons pas pu réaliser des entrevues dues aux critères des permis éthiques. Malgré la restriction liée à ce design, nous avons pu néanmoins caractériser les différentes valeurs exprimées par les populations envers le carcajou. Il serait néanmoins judicieux d'envisager des entrevues avant une collecte de questionnaires lors d'une prochaine étude afin de faire ressortir certaines valeurs et les points d'intérêts suscités par cette espèce.

Notre étude dans le zoo offrait un cadre de travail intéressant, mais de nombreuses contraintes nous ont obligé à revoir les questionnaires adultes: le temps alloué aux questionnaires, les conditions météorologiques (peu de visites lorsqu'il pleut), la difficulté de faire remplir la deuxième partie du questionnaire en fin de visite. Nous avons dû adapter à deux reprises la méthodologie : changements dans la structure du questionnaire et le lieu de sa distribution (à l'intérieur du zoo) pour obtenir un meilleur taux de participation.

La méthodologie a aussi dû être adaptée pour les enfants puisqu'ils ne voulaient pas remplir le même questionnaire avant et après le camp. Nous avons donc choisi d'échantillonner la moitié des enfants avant le camp et l'autre moitié en fin de camp.

Pour les écoles, le temps alloué à l'atelier a parfois varié selon les temps de pauses, laissant un peu moins de temps pour la réalisation des dessins.

Nous avons dû aussi enlever certaines parties du questionnaire dont la carte de répartition mondial du carcajou, les enfants étant incapable de placer leur ville ou leur région sur la carte. Sur la première page du questionnaire il y avait une photo du Carcajou, les enfants ayant vu le questionnaire, il aurait été possible que lors de la représentation des dessins, ils se rappellent de la photo et s'en inspire pour dessiner le carcajou (suite à l'analyse des dessins, l'image du carcajou ne parait pas avoir influencé les dessins car très peu d'enfants ont représentés le carcajou de la même manière ou comme sur la photo). Pour pallier à cet éventuel problème, nous avons donc donné comme consigne qu'une fois une page du questionnaire tournée, il n'était plus possible de revenir en arrière et de regarder la page précédente. Il fallait environ 30 à 45 minutes pour remplir le questionnaire de 12 pages et enfin arriver au dessin.

Chapitre 5 I think it is the toughest animal in the North": human-wolverine interactions among hunters and trappers in the Canadian Northwest Territories

Morgane Bonamy, Thora Martina Herrmann & Andrew Blair Harbicht (2019) 'I think it is the toughest animal in the North': human-wolverine interactions among hunters and trappers in the Canadian Northwest Territories, Polar Geography, DOI: 10.1080/1088937X.2019.1685020

Contributions des auteurs

Mise en place du protocole de l'étude (Morgane Bonamy)

Collecte des données (Morgane Bonamy, Andrew Harbicht)

Analyse des données (Morgane Bonamy, Thora Herrmann)

Interprétation des résultats (Morgane Bonamy, Thora Herrmann)

Rédaction du manuscrit (Morgane Bonamy)

Commentaires et correction du manuscrit (Morgane Bonamy, Thora Herrmann, Andrew Harbicht)

Afin de répondre au sous objectif : Caractériser les connaissances et les valeurs, les attitudes, les usages, et la motivation des trappeurs des Premières Nations Dénées et Métis dans les Territoires du Nord-Ouest, dans la région North Slave envers le carcajou – territoire où l'humain et l'animal partagent le même espace, nous avons interrogés les trappeurs et chasseurs des nations Métis et Dénées des Territoires du Nord-Ouest. Nous avons créé un espace pour que les voix autochtones puissent être entendues afin de caractériser et comprendre la place des relations humanimales contemporaines et historiques dans la culture et l'identité.

5.0.1 Abstract

The wolverine (Gulo gulo), a carnivore species of 'Special Concern' for its western population and 'Endangered' for its eastern population, is of special management concern in Canada. Hence understanding human-wolverine relationships and human perceptions toward this carnivore species has become important. Moreover, wolverines are harvested for fur in northern Canada, thus hunters and trappers who live in the vicinity with this species are key stakeholders. Using semi structured interviews and questionnaires we analysed human wolverine interactions and perceptions among Dene and Métis hunters and trappers in the Canadian Northwest Territories. We found that hunters and trappers had comprehensive knowledge about wolverine ecology and behavior. Values associated with this species ranged from respect for their tenacious character and strength, to describing the wolverine as a trickster. Stories emphasizing the wolverines' mischievous nature were also common. Dene and Métis hunters and trappers acknowledge the importance of the wolverine in the socio-ecological system and have observed the cumulative impacts that climate and human-induced landscape change have had on wolverine habitat and population dynamics. Listening to hunters and trappers is one path towards more insightful management options in situations involving conflicts with wolverines.

5.0.2 Résumé

Le carcajou (Gulo gulo), une espèce carnivore de statut « préoccupant » pour sa population de l'ouest et « en voie de disparition» pour sa population de l'est, est une source de préoccupation particulière au Canada. Par conséquent, il est important de comprendre les relations humain-carcajou et les perceptions envers ce carnivore. De plus, les carcajous sont capturés pour leur fourrure dans le nord du Canada, ce qui fait que les chasseurs et les trappeurs qui vivent à proximité de l'espèce sont donc des acteurs clés. À l'aide d'entrevues semi-structurées et d'un questionnaire, nous avons analysé les interactions et les perceptions envers le carcajou chez les chasseurs et les trappeurs Dénés et Métis des Territoires du Nord-Ouest au Canada. Les chasseurs et les trappeurs ont une connaissance approfondie de l'écologie et du comportement du carcajou. Les valeurs associées à cette espèce diffèrent: les participants ont exprimé leur respect pour le caractère tenace et la force de cette espèce mais

ont également décrit le carcajou comme un « *trickster* ». Les histoires mettant en avant la nature espiègle des carcajous étaient courantes. Les chasseurs et les trappeurs Dénés et Métis reconnaissent l'importance du carcajou dans le système socioécologique et observent les effets des changements climatiques et de ceux induit par l'homme sur l'habitat du carcajou et la dynamique de sa population. Dans les situations de conflits avec les carcajous, tenir compte de l'expérience des chasseurs et des trappeurs serait un moyen de gestion plus efficace.

5.1 Introduction

Carnivore conservation and management involves complex human-animal interactions and depends on the sociocultural, socio-political and ecological context (Young, Ma, Laudati, & Berger, 2015). Protected areas figure prominently in carnivore conservation strategies. Yet, with their large area requirements and with increasing habitat fragmentation and human encroachment on carnivore habitats (May, Landa, van Dijk, Linnelle, & Andersen, 2006), many carnivore populations occur in shared human-animal landscapes outside protected areas (Deguise & Kerr, 2006; Di Minin et al., 2016; Persson, Ericsson, & Segerström, 2009a). Wherever humans and carnivores coexist, a wide array of conflicts can occur and act as a barrier to carnivore conservation (Woodroffe, Thirgood, & Rabinowitz, 2005). These can include, for example, depredation of domestic animals and livestock (Treves & Karanth, 2003) competition with hunters for game species (Carter & Linnelle, 2016), or real and perceived impacts on human health (Nyhus, 2016). In Canada, as in other Nordic countries (Persson et al., 2009a), many of the large carnivore species (e.g. wolverine Gulo gulo, wolf Canis lupus, black bear Ursus americanus, and grizzly bear Ursus arctos ssp) range outside protected areas where they are vulnerable to human activities (Slough, 2007). Hence, effective, adaptive, and informative management and conservation planning frameworks, driven by biological and sociopsychological data such as human values, attitudes, and risk perceptions, are essential (Treves & Bruskotter, 2014).

Wolverines are the largest species in the Mustelidae taxonomic family (Kyle & Strobeck, 2001). They are circumpolar carnivores that live primarily in taiga, tundra and mountainous habitats (Banci, 1994; Ruggiero et al., 2007). Their individual territories are vast, generally ranging from 335 to 763 km² (Banci, 1987; Fortin et al., 2005; Landa, Strand,

Linnelle, & Skogland, 1998; Lewis & Barten, 2008). While individual territories sometimes overlap, population densities tend to be very low compared to other carnivores (Inman, Magoun, Persson, & Mattisson, 2012). Densities range from 1/207 km2 in British Columbia (Quick, 1952) to 1/777 km² in the Yukon (Banci & Harestad, 1990). They are primarily scavengers but are also capable of hunting live prey when necessary (Persson, 2003). Though they are the largest terrestrial members of the Mustelidae family, wolverines are small relative to other northern carnivores, weighing from 8 to 18 kg, (Banci, 1994; Persson, Wedholm, & Segerström, 2009b). Wolverines are solitary carnivores and very intelligent; often able to remove bait from a set trap without being caught (Banci, 1994).

Identified simultaneously as a species at risk and a highly valued source of fur, wolverines are of special management concern across their circumpolar distribution range. Within Canada, wolverines are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2014) as a species of Special Concern for the western population and Endangered for the eastern population (Quebec and Labrador).

Wolverines are harvested, by hunting or trapping, across northern Canada, mainly by fur trappers (Kukka & Jung, 2016). Due to its insulating and frost resistant properties (Banci, 1994) and its beauty (Quick, 1952) wolverine fur is highly valued and widely used in northern communities in Canada as fur trim on winter parkas (Benson, 2014). This results in continued trapping of this species for the fur industry despite their declining numbers. In 2013, 80% of the wolverine pelts sold in Canada were from the Northwest Territories (hereafter NWT), Nunavut, Yukon and British-Columbia (Thibault, Fisher, & Ray, 2013). According to Slough (2007, p. 78) only '6% of the wolverine's present range in Canada and 10% of the 'high' relative density range in western Canada is within parks and protected areas'. With the majority of their main range outside protected areas, wolverines are vulnerable to hunting, trapping, recreational activities, or resource development (Slough, 2007).

Because of their concern for conservation, combined with their relatively low population densities and relatively high levels of harvest, stakeholders in conservation and wildlife management across the species' range are particularly interested in determining risks, assessing human effects, and mitigating conflict with wolverines (e.g. Sæther et al., 2005; Dalerum, Shults, & Kunkel, 2008). According to Ericsson, Kindberg, and Bostedt (2007, p. 2)

'*People's attitudes towards large predators are becoming increasingly important as more and more management institutions worldwide recognise the need for human dimension data.*'

A wide array of social and psychological factors shapes human relationships with wildlife (Decker, Lauber, & William, 2002; Nyhus, 2016). These comprise human attitudes towards wildlife, cultural values, spiritual/religious beliefs, stories associated with animals, direct experiences (Dickman, 2010), and how people perceive management policies (as contrary to or in line with personal value orientations).

Though wolverines rarely present a true danger to humans (i.e. there are no official records of a wolverine attacking a human), they have maintained a strongly negative reputation among the public (Thibault et al., 2013) exceeding that of nearly all other northern species (Fortin et al., 2005; Woodford, 2014). The wolverine's behavior is often described as aggressive, fierce, and even devilish (Fortin et al., 2005; Hash, 1987) while their ability to steal bait from traps without being captured makes them unpopular among trappers who lose income as a result (Banci, 1994; Seton, 1953). Wolverines also enter occupied camps at night to steal freshly hunted meat (Seton, 1953) or break into unoccupied cabins to steal anything edible (Benson, 2014). Furthermore, as wolverines often urinate on whatever food they don't eat, a deterrent against other scavengers (Banci, 1994; Benson, 2014), such encounters are problematic beyond the simple loss of food.

In many indigenous societies, the wolverine is a cultural keystone species (Cardinal, 2004; Garibaldi & Turner, 2004) often regarded as the creator of the world (Savard, 1971) or the oceans (Peastitute, 2013). In the NWT, traditional stories often describe the wolverine with human attributes; smart, gluttonous and mischievous, able to steal, kill, make people laugh, or play vicious or mean tricks on them (Moore & Wheelock, 1990). The wolverine's role in myths often includes acting as a link between humans and the supernatural world and helping people interpret their place in that world (Millman, 1993; Moore & Wheelock, 1990; Peastitute, 2013). In most tales, however, wolverines are depicted as a trickster (Millman, 1993; Moore & Wheelock, 1990; Peastitute, 2013; Savard, 1976).

An elusive species, wolverines require large, intact ecosystems and therefore function as an indicator species for the ecological integrity of an area (Cardinal, 2004; COSEWIC, 2014). Climate change, however, is predicted to shift wolverine population distributions, connectivity, and dispersal corridors, even in wilderness areas that remain unaffected by direct

human alterations (Mckelvey, Lofroth, Copeland, Aubry, & Magoun, 2011), due to their dependence on long-term snow cover over the winter months (Inman et al., 2012). Wolverine abundance may further decline as wolverine home ranges and human activities increasingly overlap (Heinemeyer et al., 2019), resulting in rising human-wolverine conflicts. Hence, conservation authorities are taking action to preserve wolverines and their habitat. Such conservation efforts, however, depend on how people perceive this species and the public's willingness to implement management practices (Luebke, Clayton, Kelly, & Grajal, 2015) as well as on favourable ecological conditions. As rightly stated by Treves and Karanth (2003, p. 1496): "*carnivore management is as much a political challenge as a scientific one"*.

We analysed human-wolverine interactions, ranging from conflicts to co-existence among Dene First Nation and Métis communities in the Northwest Territories, where humans and wolverines live in shared landscapes. We examined people's perceptions and values associated with wolverines in an attempt to assess people's willingness to accept new wolverine management initiatives. Based on our results we suggest some directions for future wolverine management strategies and conservation plans.

5.2 Methods and Materials

5.2.1 Study Area

Our study is based on data primarily collected during two periods between March 2014 and July 2016. Fieldwork was carried out in three communities in the North Slave Region of the Northwest Territories (Figure 5.1): Fort Smith, Ndilo and Dettah. Ndilo and Dettah are small Dene First Nation communities of approximately 200 and 160 inhabitants respectively. Both are located just outside of Yellowknife, the capital of the NWT, which counts nearly 20 000 inhabitants. Travel between Yellowknife and Dettah is possible in summer by an all-season road (26 km) though the distance is greatly reduced in the winter due to the use of an ice road (6.5 km) across part of Great Slave Lake. In contrast to these two communities, Fort Smith is both larger, with 2500 inhabitants, and further away from the capital city. Situated near the border with Alberta, Fort Smith is south of Great Slave Lake, on the Slave River.

Wolverines range throughout the NWT, where their principal food source is barrenground caribou, both living and dead (Mulders, 2001). The estimated wolverine population size in the NWT is approximately 3,000–6,000 (Species at Risk Committee, 2014, p.vii). Wolverines are presently listed as Not at Risk in the NWT, however, continued harvesting, decreasing caribou abundances (food resources), and human activity are all potential threats to the persistence of this species in the NWT (Species at Risk Committee, 2014).

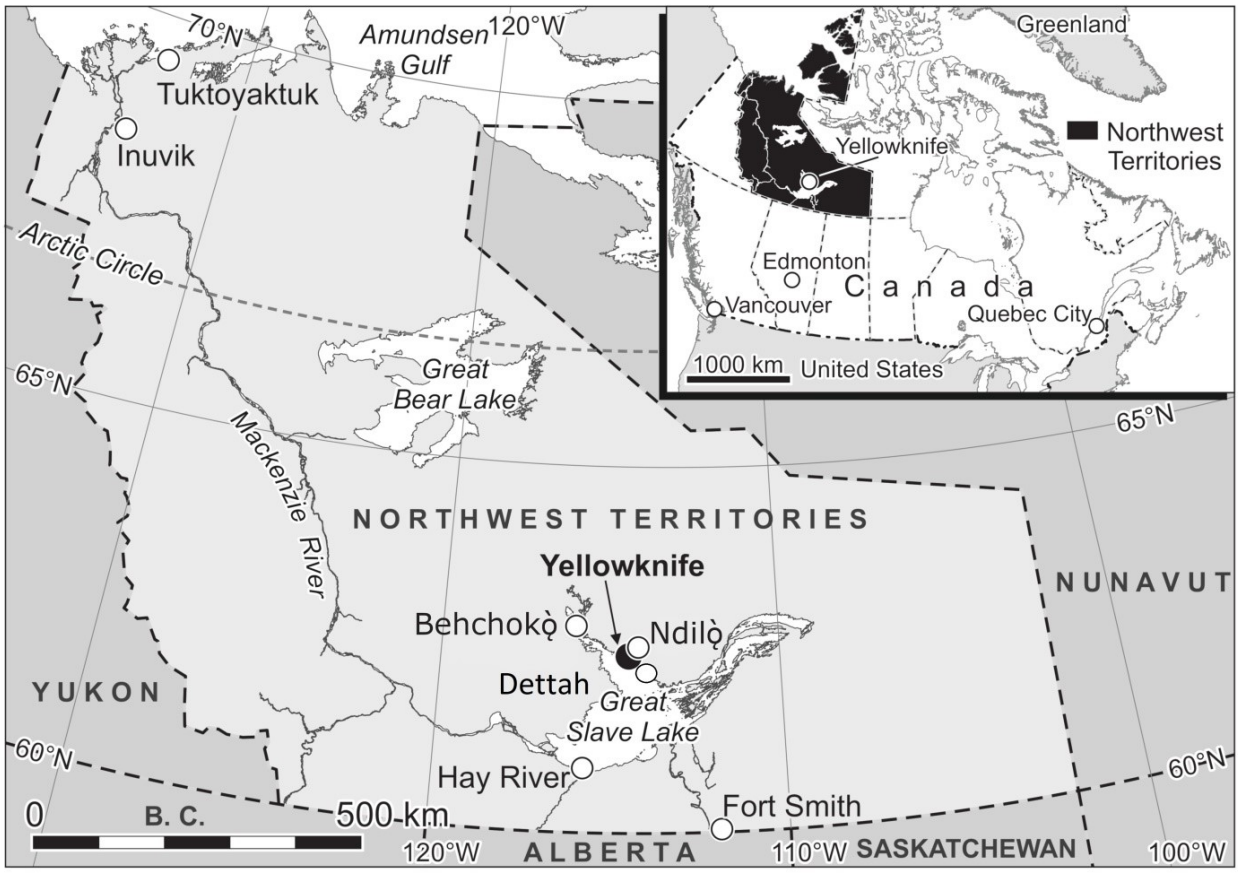

Figure 51: Location of the three participating communities, Fort Smith, Ndilǫ and Dettah in the North West Territories (NWT). Cartography adapted: Marc Girard, University of Montréal, 2016.

5.2.2 Data Collection

Prior to any fieldwork taking place, we obtained ethics certificates from the Ethics Committee for Arts and Science Research of the University of Montréal, Canada (CERFAS-2013-14-201-D) and Aurora College in Yellowknife (Scientific Research Licence No. 15456). A total of 15 semi-structured face-to-face and phone interviews were carried out with residents of the three communities. The 15 participants were selected based on the following conditions: (i) they self-identified as being First Nation or Metis, (ii) they were over 30 years-of-age and have hunted or trapped in the past for at least 20 years, and (iii) they were currently living in the NWT. We interviewed 4 women and 11 men in total with the help of two Dene members Fred Sangris (former Ndilo chief) and Camilla Zoe Chocolate (Director of the Lands and Environment bureau for the Dene Nation), and one member of the Metis Nation (Christina Chakanyuka). Interviews took place according to the wishes of the participants, e.g. either in a private room at the Dene Nation Band Council offices in Yellowknife or over the phone (for Métis and Dene members from Fort Smith). Interviews lasted on average one hour and were primarily conducted in English, though the option of conducting the interview in the Dene language was offered. Only one participant chose this option and their interview was immediately translated into English by a translator upon its conclusion. All interviews were digitally recorded after receiving consent from the participant. Interviews covered six specific themes: (i) carnivores, (ii) knowledge and attitudes associated with wolverine, (iii) hunting and trapping practices, (iv) conflicts with wolverines, (v) threats to wolverines, and (vi) wildlife management. In addition to the above mentioned interviews, 12 semi-closed questionnaires were conducted with the same participants. Questionnaires focused on five themes: (i) carnivores in general, (ii) wolverines, (iii) threats to wolverines, (iv) perception/attitude/willingness to support wolverine conservation, (v) hunting habits. By employing a combination of several qualitative research methods we obtained data triangulation that allowed for validation of data through cross-verification of different sources.

5.2.3 Data Analysis

Once transcribed, interviews were manually coded by subdividing the data and assigning category labels (Dey, 1993). We then performed a thematic content analysis identifying the frequency of the dominant themes in our textual dataset (Weber, 1990). We included information from the interview and the questionnaires into the coding procedure of our six main themes.

Questionnaire data were analysed using descriptive statistics. We performed a semantic analysis on interview data isolating words used by the interviewees to characterize wolverines. A word cloud (Figure 5.2) based on the most frequently used words from our interviews was also created using R to reveal and represent social emotions linked to wolverines.

Figure 5.2: Word cloud, where size represents frequency, of words used by of First Nation and Métis (in the interviews) to characterise wolverine in the NWT.

Participant's perception of wolverines and attitudes associated with wolverines were derived and classified according to a typology adapted from past work on similar subjects (Berghöfer, Rozzi, & Jax, 2008; Cooper, Brady, Steen, & Bryce, 2016; Kellert, 1980), (Table 5.1). The values contained in Kellert's (1980) typology, namely ecologistic, naturalistic, aesthetic, and negativistic, matched hunter/trapper interactions with wolverines that we estimated to be important for gaining a local context. Cooper et al. (2016) created a value system which explores spiritual and cultural values associated with ecosystems that served in our study to describe the role that wolverines hold in indigenous (i.e. First Nation and Métis) culture, identity and spirituality. Finally, we employed the value categories providing nature and nature as a self-reliant companion included in the typology by Berghöfer et al. (2008) to reveal the benefits that animals, as part of an ecosystem, provide and the resulting moral responsibilities people develop towards nature.

Table 5.1: Typology of values towards wolverine adapted from Kellert (1984b), Berghöfer et al. (2010) and Cooper et al. (2016).

Value	**Representations associated with values**
Aesthetic	Animal species are physically attractive.
Cultural/Spiritual	Animal species are embedded in cultural practices and belief systems. Animal species embody spiritual importance. Symbolic significance of animals.
Ecological/Regulating ecosystem	Interdependence between animals and their natural habitat. Animal species have a regulating function in the ecosystem. Interrelations between animals in ecosystems.
Naturalist	Interest for wildlife and nature.
Nature as a self-reliant companion	Animal species have a right to live.
Negativistic	Animal species do damage to humans and their livelihoods. Animal Species must be controlled and mastered.
Providing nature	Animal species provide material and economic resources to maintain the lives of local residents.

5.3 Results and Discussion

5.3.1 Human-wolverine interactions and perceptions associated with wolverines

One-quarter of participants used hunting as their main source of food, while the remaining 75% used hunting to supplement their food supply. Aside from the word "wolverine", different names were used to describe this species in 83% of the interviews we conducted, including "*devil*", "*nogha*[22]", and "*glutton*". The majority of participants associate wolverines with strength and power, and considered them as smart due to their ability to break traps and escape capture. Indeed, when asked to describe the wolverine, 71% of the participants used the word "*intelligent or smart",* followed by "*ferocious"* (50%) and "*thief*" (42%). From the interviews and surveys we conducted, the following values emerged as being commonly expressed by participants (Figure 5.3).

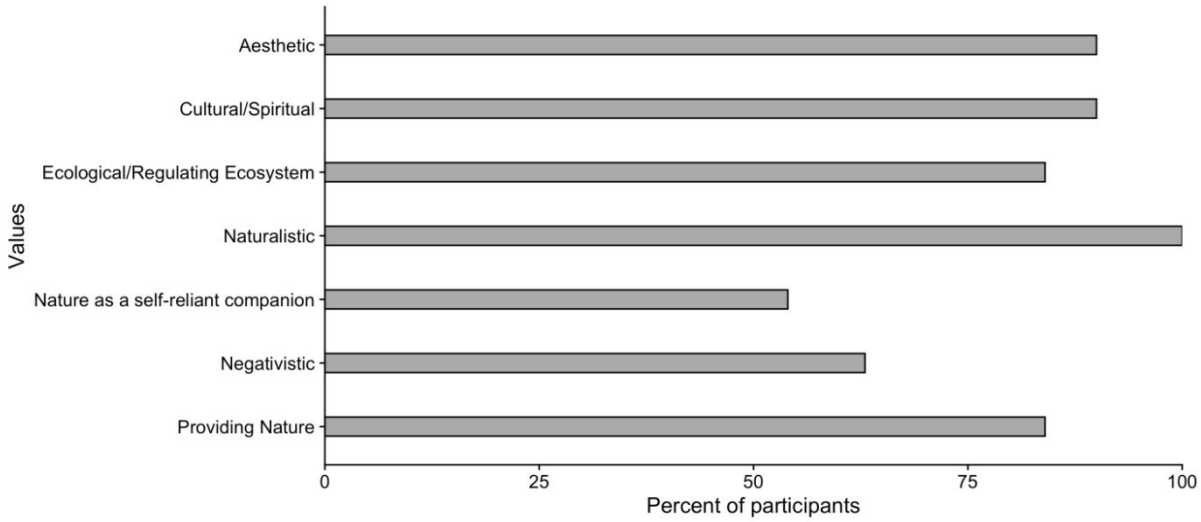

Figure 5.3: Values associated with wolverine by Dene First Nation and Métis participants in the Canadian NWT.

[22] "*Dene people here call them Nohga [in the Dene language]. Nogha means when you are chewing on something all the time. It is like cutting something or chewing something. The wolverine is like that, like when they chew on a bone they break it right up. A very tough animal. It's kind of like a statement, like cutting or sawing soothing, Nogha*" (participant # 8, Ndilǫ, man)

5.3.1.1 Providing nature value

Over four fifths (82%) of our participants expressed dependence on wolverines as an economic resource. The use of wolverine fur for clothing, especially as trim for garments due to its durability and frost-resistant characteristics, was often commented on: "*Wolverine is good to put on your parka. I've got gloves and a parka.*" (participant # 10, Dettah, man)*;* "*Most of the time other people want it for trimming and for gloves and stuff like that. In that way, they are very valuable*" (participant # 5, Fort Smith, man). People use wolverine fur in apparel differently according to whether it is for a woman or a man. There were also cultural differences and participants commented on the use of the fur by Inuit peoples in the northern part of the NWT:

> *Often it's part of the women's fur coat. Not the fur coat, but the northern parkas that we had to make. And I know the Inuit and that further up north, 'utchinenen', they used to use it for the sunburst too. Part of that wolverine fur would become part of the sunburst on the hood.* (participant # 6, Fort Smith, woman)

One participant referred to wolverine in regards to medicinal purposes*:* "*And we use them for first aid too.*" (participant # 10, Dettah, man), though they did not elaborate further, while elders remembered the utilitarian value of wolverine meat as a food resource: "*We used to eat wolverine too* [...] *like a bear.*" (participant # 11, Ndilǫ, man).

Prices for a wolverine pelt are high, ranging from $250 to $750 for industrial purchases, from $400 to $600 for private buyers, and up to 2000$ for a tanned fur (Roussown, pers. comm. 2014). Due to this high market value, wolverine pelts remain a considerable source of income for trappers (Benson, 2014). This was pointed out by many of our interviewees who sell wolverine hides to make a living: "[...] *a wolverine pelt gets us, what, 400–500$*" (participant # 11, Ndilǫ, man). Most fur is sold locally and does not enter the fur trade via auctions:

> *When [name of friend] and I was trapping, we use to catch anywhere from 5 or 6 [wolverines], and upwards of that in a year. Mostly we don't sell them in the auction, because they were up and down in the auction and you don't know what you could get. So, we use to sell*

them privately to people for trim or for rugs and all sorts things.
(participant # 3, Fort Smith, man)

Tanned hides sell at the highest price: "*Wolverine tans are very expensive to buy,* [*because*] *they are very hard to tan*" (participant #4, Ndilǫ, man). Wolverines are economically valued as furbearer and important means of sustaining Indigenous People's livelihoods throughout the Canadian Arctic (e.g. ICC et al., ; WMAC(NS), 2008; GRRB, 2014). In the NWT, according to Slough (2007): 1,219 wolverines were harvested during the 1992/93–2003/04 trapping seasons; an average of 101 wolverines per trapping season.

5.3.1.2 Ecological/Regulating Ecosystem value

The role of wolverines as a regulating function in the ecosystem was acknowledged by 82% of the participants in this study. In particular, the importance of wolverines in the food chain as a scavenger was highlighted: *"They [wolverine] are the clean-up guys, they clean up everything that's left behind. They keep the land clean of animals that have been killed"* (participant # 1, Fort Smith, man). Several interviewees commented on the value of wolverine as pest control: *"[The wolverine] is doing what is natural for him, cleaning up the carcasses, from disease. Some animals have some diseases, and they die and wolverines take care of them. The wolverine takes care of everything."* (participant # 2, Fort Smith, woman). Similarly, a Dene Elder pointed out: "*Wolverines pretty well take care of all the carcasses that they come across and they control the diseases, so that we don't have any diseases from other animals.*" (participant # 9, Dettah, man). Herrmann et al. (2013) found similar results regarding the South American wild cat kodkod or guiña (*Leopardus guigna*) which the Mapuche people valued as a pest control agent.

The understanding of wolverine's contribution to ecological equilibrium was dominant in the discussions: "*Absolutely they [wolverine] have their part to play in the whole balance of the ecosystem and the biodiversity in the area. They definitively have a place out here."* (participant # 7, Fort Smith, man). Interviewed hunters and trappers also commented on the interactions between animals in ecosystems:

> *That's why you see them when we're hunting caribous because where the caribous are, the wolves are, and the wolves kill the caribou and the wolverine comes behind cleaning up wolf kills, or the hunter kills too.* (participant # 1, Fort Smith, man).

"They always follow wolves because they know that wolves kill things eh. And they will clean up after the wolf. That's why they travel together as a pair." (participant # 1, Fort Smith, man). Several people pointed out that marten and wolverine were brothers: *"If we catch a marten, he [wolverine] will just go by, [he] doesn't touch the marten. [They are] Brothers-in-law. He won't touch it."* (participant # 13, Dettah, woman).

5.3.1.3 Naturalistic value

The naturalistic value orientation was commonly expressed among the participants. Ericsson and Heberlein (2003) and Knight (2008) stressed the link between direct exposure to animals and the naturalistic value. This was also observed in our study, with several Dene and Métis hunters and trappers describing their relationship with nature as strong: " I was raised in the bush by my father and my brothers. I've hunted probably all my life, off and on […] and trapped in the bush, and also raised my family on land, until they were able to go back and go start high school." (participant # 5, Fort Smith, man). Based on their daily observations while out on the land, Dene and Métis hunters and trappers built a solid knowledge base about wolverine occurrences and behavior:

> *If the wolverine is walking on top of the snow, [and] it doesn't go deep into the snow, it is a skinny wolverine. It is not a good hunter; that is what it means. […] when you see a wolverine in a bush and he is walking across the lake here, if the tracks get deep into the snow it is a bigger wolverine or a fat wolverine. (participant #8, Ndilǫ, man).*

Many participants also commented on the wolverine's survival instinct in harsh environments: "*is a powerful animal, small, but it is amazing what they can do with their size.*" (participant # 7, Fort Smith, man); "*They* [*wolverines*] *are good providers for themselves, their family, there are not afraid to take anything, even* [*things*] *bigger than themselves.*" (participant # 9, Dettah, man). We agree with Schüttler, Rozzi, and Jax (2011, p. 181) in that:

> *the common critique that members of the general public might have insufficient knowledge and motivation to contribute to environment-related decision making in a valid and meaningful way (as summarized by Fischer and van der Wal 2007, p. 256) does not hold here*.

Dene and Métis knowledge about this endangered species can certainly help to fill the lack of data and gaps in the scientific knowledge, as has been shown for other animal species (Henri, Gilchrist, & Peacock, 2010).

5.3.1.4 Aesthetic value

Respondents often used positive words such as "beautiful" to describe wolverines: "I am not on the land travelling all the time, but when they bring home a wolverine, it's a beautiful animal […], It's very handsome. I really think they are [a] very good looking animal." (participant # 6, Fort Smith, woman). The visual appeal of wolverines was also perceived differently by people depending on their region or where the encounters occurred: "They are beautiful animals, very beautiful. The wolverines you get more in barren lands, they have a more distinct pattern in their fur, which is really beautiful." (participant # 7, Fort Smith, man).

In addition to being aesthetically appealing, wolverines were admired by many participants for its strength "I think it is the toughest animal in the North." (participant # 8, Ndilǫ, man), "I highly respect them because I know that even though they are small, they can be really ferocious." (participant #6, Fort Smith, woman). Trappers considered also wolverines to be highly intelligent "He is really a smart animal." (participant # 12, Dettah, man) and shared numerous anecdotes about instances when wolverines succeeded in freeing themselves from traps:

> *[…] we caught a wolverine. So we tracked him for two days. Everywhere where he got caught he'd clean all the bush around him. He'd clean it out and be gone again. He would chew the power cord that we'd used for holding the [batten] down, he'd chew it to the point that there was nothing left, you just had the trap. Even while we were chasing him. Once he had the trap, he'd just kind of disappear. You were not able to track him anymore. He was somehow carrying that chain, or whatever it was. He was very, very, smart in that way. (participant # 5, Fort Smith, man)*

Many of the respondent's stories even described wolverines as a symbolic representation of intelligence and cunning:

> *One time I was in [the] barren lands, I see a grizzly bear feeding on the caribou's carcass. […] And a wolverine came; he went around the grizzly bear. The grizzly bear [could] see the wolverine and was looking at him, […] if the wolverine goes this way, the bear goes this way, […] The grizzly bear walk around and around, and he [the wolverine] took the caribous carcass, the wolverine pulled it away from the grizzly bear and the grizzly bear walk after slowly, and the wolverine pull it for 30 feet from the grizzly bear. And [when] he is eating it, the grizzly bear is standing here, looking at him, and he is scared because the wolverine can bite hard. (participant # 8, Ndilǫ, man)*

Several authors stressed the correlation between aesthetic appreciation of '*charismatic*' animal species (Ducarme & Courchamp, 2013) and its influence on attitudes (De Pinho, Grilo, Boone, Galvin, & Snodgrass, 2014; Frynta, Lišková, Bültmann, & Burda, 2010). Positive perceptions of charismatic animal species grounded on aesthetic appreciation results in higher public interest, acceptance, and empathy of a species (Knight, 2008) leading to greater support of conservation policies (Brambilla, Gustin, & Celada, 2013). This, however, does not automatically lead to a better conservation state for a species (Courchamp et al., 2018).

5.3.1.5 Cultural/Spiritual values

The wolverine is the main protagonists in many Indigenous legends in Canada where it embodies an important trickster character and is in communication with the spirit world (e.g. Peastitute, 2013; Savard, 1971; Swann, 2005), like the raven in northwest coastal legends (Ballinger, 2006) or the great hare (Nanabozho) in Ojibwe storytelling (Erdoes, 1999). Ricketts (1966, p. 329) in his study about trickster animals in North American Aboriginal legends pointed out that: "the trickster and hero roles are always combined in one figure". Carroll (1981, p. 305) noted that: "the trickster appears as a type of culture-hero, specifically as a transformer who makes the world habitable for humans", and referring to Levi-Strauss she points out that: "the trickster is associated in these stories with the origin of culture" (Carroll, 1981, p. 305).[2] Among the Dene First Nations in the NWT, wolverines features in numerous legends as tricksters but also as spiritual guides with healing powers (Moore &

Wheelock, 1990). Dene and Métis hunters and trappers we interviewed frequently highlighting the point that the wolverine "is a legend, a living legend … " (participant #8, Ndilǫ, man), and "important for our [Dene] culture" (participant #9, Dettah, man). The wolverine often appears as a human in stories:

> *So the wolverine was a man, in the legend, and he lived among the Dene for many years. He has a chance to go back to a wolverine or to remain a man for the rest of his life. For him, he chooses quickly, he took no time to think about it. He said: "I want to be a wolverine; I don't want to be a man anymore. The man works too hard. It is too much work. Too much hauling wood, looking for food, tepee poles, it's too much. I'd rather be a wolverine. I don't have to raise children, I can be free. So he decided to be a wolverine and he is still a wolverine today, according to the legend.* (participant #4, Ndilǫ, man).

Another story, portrayed wolverine raising a human child:

> *A woman is living in the bush out in the land. The wolverine took a child and inside 3 days it becomes a young man […] One day it is a baby and the next day he is a young teenager and the third day he is a man. You know, one, two, three. [In] three days he is a man. […]. The parents of the baby they didn't bother, they knew where the little boy went […]. That is a legend about wolverine, about how clever he is and about how he raised this child, and he became a hunter, this man. The wolverine […] called him my son, because you, know he raised him. […] he said you go over [to] the family over there, my son, and meet over there, and provide, caribous, like you know, they will need caribous, […] and he became a natty [smart] hunter. From there, he provides. (participant #13, Dettah, woman).*

Many Dene and Métis stories portray wolverine as thinking, talking, and living like humans. According to Legge and Robinson (2017, p.3): "*this view of animals is not anthropomorphism—that is, human traits projected onto animals—rather, personhood is understood as an experience common to all forms of life (Hornborg, 2013)*".

Wolverines also have a ceremonial significance: "*Just showing respect for it* [*wolverine*]. *Some ceremonies we aren't allowed to tell* " (participant # 6, Fort Smith, woman). Whenever out on the land, people address the wolverine directly:

> *[…] my dad would tell me that they [wolverines] see you before you see them. So they know you're coming, they know you're there. If you acknowledge yourself as part of creation, if you acknowledge yourself*

> *and talk to them. We talk to the animals, I talk to them. […] Whenever I come out on the land, I'd tell them 'look I'm here for this amount of time, there's lots of room here. I ask that you protect me and the kids, take care, don't hurt us, don't hurt my kids', because they are going to be all over the place. (participant # 6, Fort Smith, woman).*

This deferential treatment of wolverines is consistent with Absolon (2010) who refers to the *wholistic* Indigenous framework where all is related; humans and animals are interconnected.

Many hunters also told how wolverines will offer themselves to the trapper: " *they will give up themselves for you and your family.*" *(*participant #9, Dettah, man); a Dene woman recalled a discussion she had with her father:

> *Dad', I said 'I don't understand it, how [can] I trap it [the wolverine], because I saw how he [wolverine] snaps the trap'. 'You know', he said, 'it is hard to explain but sometimes animals have some respect for you, like a trapper. That's why he went to your trap and he didn't snap your trap' […] It is very spiritual, the way the Dene people live. (*participant #13, Dettah, woman).

While trapping wolverine, Dene and Métis people follow certain practices, such as not talking about traps "*If you put 100 traps, you don't talk about it because if you talk about it the wolverine is going to go through all the 100 traps.*" (participant #10, Dettah, man), or not wearing wolverine fur on parkas or gloves, because " *We try not to use wolverine hair ourselves because, for hunting, it may scare off the other animals*." (participant #5, Fort Smith, man).

Participants stated that a person may be described as being like a wolverine if they act mischievously, slyly or need to be treated with wary respect, but also, and perhaps paradoxically, if they display loyalty:

> *Sometimes we may give a person the name [wolverine], if they seem to display the characteristics of a wolverine […]. They would be a damned good thief. They are unpredictable, but they are very loyal to their family. Their characteristics would be ... very strong and they can be vicious too if they have to.* (participant #6, Fort Smith, woman).

The name wolverine was commonly used to portray a thief: '*When someone is going into your camp and taking things without asking, sometimes we might describe that person as a wolverine*.' (participant #5, Fort Smith, man); also,

> *there are always people who are thieves and stuff, right? Light fingered, I guess is another word for them. But when people talk about those kinds of people sometimes they'll say 'oh he's a real wolverine', because the wolverine likes to steal stuff like meat […] and haul it away.* (participant #1, Fort Smith, man).

Conversely, the term wolverine was also applied to brave, very hard working persons who take care of their family:

> *He actually called his cousin a wolverine. He [his cousin] just bends over like a wolverine and he doesn't stop. Even though he's a pretty hefty guy […]. But you wouldn't think that a guy like that could work as hard as he did. So he always refers to him [his cousin] as a wolverine.* (participant #3, Fort Smith, man).

We agree with Fernández-Llamazares and Cabeza (2018, p.3) when they state that: "*appraising sociocultural representations of nature through indigenous stories allows conservation practitioners to better understand traditional cosmological systems in relation to wildlife and landscapes […]".*

5.3.1.6 Nature as a self-reliant companion value

Many participants (54%) believe animals, and wolverines, have the inherent right to live, as stated by a Métis woman: "They [wolverines] have more rights than us I think […].' (participant # 6, Fort Smith, woman). Some referred to wolverines as Godly creations: "They are all God-given and you have a responsibility to protect them. All animals … " (participant #7, Fort Smith, man).

Many participants expressed the idea that as Dene First Nation and Métis people, they shared the obligation to remain connected with the land and all forms of life in it (Absolon, 2010). Accordingly, a Métis woman from Fort Smith exclaimed:

> *How many times do we get this perception, thinking that we own everything. We don't. We are the ones who have been created here. You need to live in harmony with the land and you need to do the best that you*

> *can. Just, I say, just give them [wolverine], a less stressful space and let them recover itself. (participant # 6, Fort Smith, woman).*

In reference to using parks as a means of conserving animals, the common sentiment was: "*They* [*wolverines*] *should be free to come and go. You can't keep them prisoner in one place.*" (participant #2, Fort Smith, woman).

5.3.1.7 Negativistic value and human-wolverine conflicts

Most respondents (63%) perceive wolverines as a particularly wild animal, always looking for food in abandoned camps or cabins. When asked why participants hunt wolverines, their answers were relatively diverse, though the three most common answers were: 34% because they wished to sell the fur, 17% because they wished to make traditional clothing, and 17% said they would hunt wolverines to prevent disturbances on their trap line causing economic loss. A few respondents reported first-hand negative experiences with wolverines, such as stealing the trap:

> *He is bad, he is stealing and everything. You know everything you will trap, he will eat everything, everything. […] they [wolverines] took all my trap, my weasel, like that. They take everything. […] crawl under the house and stay here. He is really bad […]. It is a burglar the wolverine.* (participant #12, Dettah, man).

"*He destroys the animals caught on the trap*." (participant #5 Fort Smith, man) was a frequent answer given by interviewees. A Métis from Fort Smith added: "*they're kind of a vicious little critter*." (participant #1, male, Fort Smith). Others pointed out the damage wolverines can do to cabins: "*They can also cause a lot of damage if they get into your cabins. They will chew up everything and urinate all over everything. They are very smart and hard to catch* [...]." (participant #4, Ndilǫ, man) or "*Wolverines do that, if you are not around. They will go in your chimney; they can even chew their way in.* " (participant #8, Ndilǫ, man). Similarly, a Métis Elder recalled that:

> *We see wolverines around on our trap line when we're travelling, like, going to and from the cabin and visiting our traps we may see the odd wolverine. […] Back in the days when we caught the caribous,[…], they [people] would store the meat and of course the wolverine comes along*

> *and he finds it, he kind of destroys it because he'll eat whatever he can, […] he'll urinate on it, once they urinate on it, their smell is pretty rank so nothing else will eat it but the wolverine.* (participant #1, Fort Smith, man).

Nearly all participants had also heard second-hand stories from a family member or friend who had experienced a negative interaction with a wolverine (i.e. stealing traps or bait).

Because of this common perception that wolverines deliberately steal from traps, they are often referred to as thieves. For example, a Dene trapper reported: "*Wolverines are thieves, once they get on your trap line; they steal your fur and wreck your traps* [...]. *They are referred to as the Devil in the Dene language.*" (participant #4, Ndilǫ, male). Negativistic value orientation towards wolverines is principally related to trapping depredation, which is concordant with findings reported elsewhere in the world, such as with the snow leopard (Oli, Taylor, & Rogers, 1994) or wolves (Álvares, Domingues, Sierra, & Primavera, 2011; Karlsson & Sjöström, 2007). Likewise, rural landowners in central-southern Chile associated neotropical guigna cat (*Leopardus guigna*) with chicken-stealing and chicken-killing and consider them as a thief (Herrmann et al., 2013).

Theft along a trapline can be hard to recover from for some people, in fact, only 9% of respondent's believed that losses from wolverine theft could be recovered by further trapping. Depredation by carnivores is often associated with economic loss (Naughton-Treves, Grossberg, & Treves, 2003; Widman, Steen, & Elofsson, 2018) and the perceived financial costs associated with wolverines visiting trap lines seems high. Such losses are known to have a strong impact on how stakeholders perceive (Figari & Skogen, 2011) and interact with a species (Woodroffe et al., 2005). When we asked participants how many prey items they would have to lose before they would decide to kill a wolverine: one third answered they would not wait until they lost a single prey to a wolverine before setting a trap for it, highlighting the seriousness of the perceived threat wolverines can represent. Fortunately for the wolverine, few other negative consequences of a wolverine presence were reported during our interviews (e.g. one participant stated that wolverines pose a risk to domestic dogs).

Negativistic views are often related to fear or distress about the animal (Karlsson & Sjöström, 2007), but in our research, none of the participants express fear toward wolverines. In fact, when we asked people how far away a wolverine should be for the participants to feel safe, all participants answered that they were not afraid of wolverines and that they felt comfortable in nature even with wolverines less than one kilometer away, such as this Métis Elder from Fort Smith: "*the closer the better. To me, a wolverine is not an animal you have to fear in the bush.*" (participant #1, Fort Smith, man). Likewise, a Dene hunter stated without hesitation: "*I'm not scared of wolverines*" (participant #9, Dettah, man). People differ in which values they express, and the level of importance they assign to each value and these differences are not static as they are the result of cumulative experiences in our daily life (Bardi & Schwartz, 2003).

5.3.2 Impacts of human disturbance and environmental changes on wolverine range, habitat and behaviour

5.3.2.1 Changes in weather conditions

Dene and Métis hunters commonly mentioned warmer winters, less snowfall and reduced ice thickness, stating that:

> *There is actually less snow, I remember when we were young we used to build tunnels in the snow […]. The color of the snow changed too. […], we have more warmer temperatures than we did when it used to get cold before […]. The thickness of the snow used to be really thick, like really deep.* (participant #6, Fort Smith, woman);

"*The temperature seems to be not as cold and we don't get as much snow. […] In the past when it was cold, we didn't get a lot of snow*." (participant #2, Fort Smith, woman). Wolverines construct their dens in snowpacks and, hence, depend on the quantity and quality of snow, especially during the denning period in spring, for rearing pups (Benson, 2014; Copeland & Mckelvey, 2010; Inman et al., 2012; Rauset, 2013). Trappers also frequently mentioned an increased risk associated with hunting and trapping in the winter. According to

Brodie and Post (2010) a decline in snowpack over the period 1974–2004 diminished wolverine abundance in western Canada (including NWT) and led to a reduction in wolverine harvest. Peacock (2011) predicts a decrease in spring snow cover and an increase in summer temperatures in the current range of wolverines in the US and hypothesized that wolverines would have great difficulty adapting to these changes and their numbers would continue to decrease.

As a result of milder winter temperatures, trappers have also noticed a change in the thickness and color of animal fur. A woman reported that: "[...] *when you're killing the Lynx, like, you only have a window because if it gets really, really cold it gets silver-ish* [...]. *I've not seen that for a long long time.*" (participant #6, Fort Smith, woman). According to all of the fur trappers we interviewed, warming temperatures have impacted their livelihoods. None of the participants, however, mentioned a change in fur quality for wolverine. Further studies are therefore needed to determine if warming temperatures will have effects on the wolverine's fur.

5.3.2.2 Decline in caribou

Dene and Métis hunters and trappers (17% of the interviewees) were concerned about the decline of caribous, the wolverine's primary prey: "*Everything depends on the caribou, so if they decrease, it* [*wolverine*] *decreases.*" (participant #9, Dettah, man). A Métis Elder from Fort Smith explained:

> *Because we're talking about the Bathurst [caribou], the heard went [from] over 400,000 down to 16,000. So, if the food source is gone by that much, you can pretty well predict, with accuracy, that there is a decline in wolfs and other species that inhabit those areas. Including, of course, the wolverine because that's where we found most of the wolverine, out in the barren lands, where there is caribou.* (participant #2, Fort Smith, woman).

Indeed, in the NWT, wolverine densities between 2004/2005 and 2011 declined by 35% at Daring Lake, by 34% at Diavik, and by 61% at Ekati (Boulanger & Mulders, 2013a, 2013b; cited in COSEWIC, 2014, p. 29). Boulanger, Gunn, Adamczewski, and Croft (2011, p.883)

reported a decline in breeding females in the Bathurst caribou herd from 203,800–16,604 for the years 1986–2009 and concluded that wolverine declines would likely parallel the declines in caribou. Vors and Boyce (2009) similarly assumed that wolverine populations will be affected by the reduction of barren-ground caribou herds. It remains to be seen whether a northward expansion and increase in moose (*Alces alces*) populations (Timmermann & Rodgers, 2017) could somewhat compensate for the loss of caribou as a scavenged meat source for wolverines.

5.3.2.3 Forest fires

Over one third (34%) of the hunters and trappers interviewed believed that the observed increase in frequency and intensity of forest fires in Northern Canada (Westerling, 2016) is a major threat for wolverine populations: "*It* [*wolverines*] *is also affected by the big fire.*" (participant #1, Fort Smith, man) because "*forest fire destroys* [*wolverine*] *habitat.*" (participant #4, Ndilǫ, man).

Participants especially considered forest fires as a threat to the primary source of food of wolverine:

> *If there's no houses or power lines […] and it's away from town, they [the government] just kind of let the trees burn and, of course, the biologists say it's good for the trees to burn. But then in the meantime what's happening is […], the whole caribou range is burning and they wonder why there's less caribou. (participant #1, Fort Smith, man).*

Similarly, a woman stated:

> *If they [the government] see that the fire is in a certain place, they just let it burn. They've been doing that for quite a while[…] they [wolverines] are affected by the fires, so some areas you may not see the wolverines for a couple of years.* (participant #6, Fort Smith, woman).

Contrary to other communities in the North Slave region, none of the interviewees in our study mentioned that vegetation regeneration after forest fires attracts prey species such as hares,

squirrels, and moose which may, in turn, attract wolverines (Beaulieu, 2006; cited in Species at Risk Committee., 2014, p. 36; Nelson, Zavaleta, & Chapin III, 2008).

5.3.2.4 Industrial development and associated infrastructure

The fact that wolverines avoid areas with human activity and noise, such as snowmobiles or vehicle traffic, or buildings (Krebs, Lofroth, & Parfitt, 2007; May et al., 2006), was echoed by our interviewees. With the decline in caribou and prey species becoming harder to find, cases of wolverines entering the mining sites, cities, hunting camps, and cabins may become more frequent. Nearly half of all participants (42%) observed an increase in wolverines in areas with mining and other industrial activities and suggested that wolverines may already be adapting to cope with human intrusions into their home ranges: "*Now, at the mine, from the kitchen* [...]*, we can see wolverine around* [...] *attracted by the smell.*" *(*participant #11, Dettah, man); " *They are curious or just hungry and they are going to try to get into an area like a mine's kitchen*". (participant #9, Dettah, man). A trapper from Fort Smith observed changes in wolverine behaviour:

> *Within the last few years, there have been sightings of wolverines, closer to the communities. So it seems like they are coming in closer to the communities or not as afraid of humans as before. And the wolverine, before they used to travel in one direction. Like if they are going someplace, they'll just keep going. It seems like now they are hanging around a little more in the area that you see them, or see their tracks.* (participant #5, Fort Smith, man).

Many participants (34%) noted that wolverines were strongly affected by noise or light disturbances around Yellowknife, notably: '*skidoos, especially in winter, wolverines have a good hearing*' (participant #6, Fort Smith, woman), but also "*noise, the lights, the trucks on the winter road* [...] *They will avoid things like that or roads, where there are too many trucks*" (participant #9, Dettah, man). Warming temperatures reduced the number of days that winter roads, i.e. ice roads, stay open. This has had an impact on people in Dettah as travel by land is more difficult without winter roads. In recent years, the open period for the northern ice road, which connects mining operations in the north, has decreased relative to the historic

average of days (CBC 2017[23]). In 2018 the ice road opened two weeks later than the previous 15-year average (CBC 2019[24]). Closed winter road, and no traffic may lead to less disturbance on wolverine, yet in their study on industrial roads in northern Alberta, Scrafford et al. (2018) found that wolverines avoided roads, even lightly used roads and winter roads being high-risk areas. According to the authors: *"Wolverines also could be avoiding winter roads because of risk from wolves that use these roads to move throughout the landscape and hunt*" (Scrafford et al. , 2018, p. 540).

5.3.2.5 Recreational activities

Hunters and trappers raised concerns about the increase in recreational activities as a source of disturbance for wolverines, as: " more people are going out onto the land too. More recreational, more ski-doos, more boats." (participant # 9, Dettah, man). Heinemeyer et al. (2019) demonstrated that wolverines avoided areas of both motorized and non-motorized winter recreation, and predicted that wolverine habitat may further decline under climate change when wolverine home ranges and human winter recreation activities increasingly overlap in the "remaining areas of persistent snow cover" (Heinemeyer et al., 2019, p. 19). The result may be an increase in conflicts between recreation industries and wolverines.

5.3.2.6 Hunting and trapping

Because a wolverine "is really hard to catch, […]" (participant # 8, Ndilǫ, man), and "they seem awfully smart" (participant #3, Fort Smith, man), none of our participants considered trapping or hunting to be a serious threat to wolverine persistence in the north. A

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[23] Canadian Broadcast corporation. The ice roads of Northern Canada are disappearing. [online] https://www.cbc.ca/radio/day6/episode-335-100-days-of-sean-spicer-disappearing-ice-roads-beatles-live-retro-futurism-at-expo-67-and-more-1.4084549/the-ice-roads-of-northern-canada-are-disappearing-1.4084560

[24] Canadian Broadcast Corporation. Detah ice road ties record for latest opening [online] https://www.cbc.ca/news/canada/north/dettah-yellowknife-ice-road-1.4973238

few respondents (17%) did not believe that anything could truly affect wolverines given their tenacity and their perceived ability to adapt: "[This] animal survived by himself. […], nothing affects them." (participant #11, Dettah, man). Kukka et al. (2017) studied the impact of wolverine harvest in northwestern Canada and found that it is primarily young male wolverines which are harvested. From this, the authors concluded that:

> *the late winter harvest is likely to have a larger impact on wolverine populations than is the early winter harvest, because of the increased proportion of adults in the harvest and the possibility of trapping breeding females that are near-term or postpartum.* (Kukka et al., 2017, p.502).

In this instance, the scientific literature agrees with the participants in our study, that wolverine populations are shifting in distribution, frequency, behavior, and population dynamics, likely as a result of the cumulative effects of human activities, human-induced landscape change and climate change (Heim, Fisher, Clevenger, Paczkowski, & Volpe, 2017; Kortello et al., 2019).

5.3.3 Attitudes towards wolverine conservation in a human-dominated landscape

When asked how Dene and Métis hunters and trappers believe the wolverine population is doing in NWT today, 33% of the survey respondents said they did not know what their current state is while nearly one fifth (17%) believed the population has remained constant over the years. One fourth (25%) believed the wolverine population in the NWT was decreasing while another quarter (25%) believed their numbers were actually increasing: "*They are wild animals, if they come, the number is high.*" (participant #13, Dettah, woman). Others thought that wolverine populations are cyclical: "*Right now I think they are on the low side, but they have a life cycle where they can rebound"* (participant #9, Dettah, man). Even so, some pointed out that: "*Before the relation with carnivores was positive, now it is negative* [...] *when they come to town.*" (participant #5, Fort Smith, man). The vast majority of respondents (83%) agreed that if wolverines were to disappear from the NWT it would have a considerable impact on the northern landscape and ecology. The remaining 17% believed

that the loss of wolverines would have little effect on the landscape and ecosystem, which seems contradictory with the perception of wolverine being an ecologically important species.

When asked to rank the general importance of wolverines in relation to other northern keystone species – bear, lynx and wolf – 66% of participants assigned the wolverine with an equal rank to the other carnivores. This is in line with results from Norway (Kleiven, Bjerke, & Kaltenborn, 2004) were people favoured wolverine and lynx conservation over that of wolf and brown bear, but is inconsistent with results by Ericsson et al. (2007) in Sweden where conservation efforts for wolverines was valued lower than for wolves, brown bears, and lynx. Ericsson et al. (2007, p. 9) found that: "*bears and wolves appear to be the most controversial species in terms of fear*" which is consistent with the view frequently expressed by our participants: "*a wolverine is not an animal you have to fear in the bush, most animals in the bush you don't have to worry about, the only one is a bear.*" (participant #1, Fort Smith, man). According to Ericsson et al. (2007, p. 9): "*wolverines are 'victims of human ignorance, and that is why they received significantly lower support than the other three carnivores*". In our study, people's social acceptance for conservation efforts was more due to the fact that wolverines are elusive, occur in small numbers, and it does not carry as much spiritual importance for First Nations or Métis Nations as a bear or a wolf. Consequently, the majority of respondents (75%) disagreed with the idea that wolverines should be listed as an endangered species.

Payments for ecosystem services, including carnivores are promoted as a conservation strategy and necessity for carnivore conservation projects (Nelson, 2009). When asked if they would be willing to pay for a hypothetical wolverine conservation program in the future, slightly more than half (58%) of the hunters and trappers in our study answered 'yes'. Among those willing to pay, half (50%) agreed to pay 50$, and 18% were willing to pay as much as 500$. The rest (32%) were only willing to give 5$. The remaining 42% of participants stated they didn't want to pay for wolverine conservation.

Interestingly, our results suggest that most of the participants that were willing to pay for a hypothetical wolverine conservation program were from the smaller rural community of Dettah, whereas participants from the much larger community of Fort Smith were reluctant to

pay for wolverine conservation. These results contradict other studies, such as Karlsson and Sjöström (2007) and Ericsson et al. (2007, p. 9) who found that: "*Willingness to pay for wolverines was positively related to 'urban municipality"*. Dene hunters and trappers have deep knowledge of wolverines and this species also plays a role in Dene First Nation culture and cosmology (Moore & Wheelock, 1990) even if its role is not as important as other carnivores. This might explain why residents of the small rural Dene communities of Ndilǫ and Dettah, who live in the vicinity of wolverines, are more in favor of increasing wolverine numbers than residents who live in Fort Smith, where the density of wolverines, and other carnivores, is lower. Moreover, Zimmermann, Wabakken, and Dötterer (2001) noticed that attitudes towards carnivores can change over time. Regarding residents of Fort Smith, we agree with Ericsson et al. (2007, p.10) who rightly pointed out that: "*people not willing to pay might still be positive towards wolverine conservation but not willing to personally pay for the improvement*". The level of education of our participants did not appear to be positively correlated with people's attitudes towards wolverine conservation, as people from Fort Smith, who had, on average, a higher education, were not more likely to be in favour of wolverine conservation relative to residents in Dettah and Ndilǫ.

Kukka et al. (2017, p.502) recommended: "*restricting their* [*wolverine*] *harvest in late winter through an earlier harvest-season closure*" which would reduce the number of harvested adults and trapping breeding females, and thus lower impacts on wolverine populations. Most hunters and trappers in our study did not support this view, however, and were not in favour of management policies targeting wolverine populations, such as limiting the hunting season or installing trapping quotas. Half of the respondents stated that they would continue trapping wolverines even if a catch limit were to be implemented, while 17% chose not to answer the question. Different reasons were given ranging from current trapping being sustainable "*We don't take that much* [*wolverines*]." (participant #3, Fort Smith, woman) to a general dislike for government interference in Indigenous harvesting practices "*The government has no business about that.*" (participant #5, Fort Smith, man) to different knowledge of wolverine population status "*Wolverine will not disappear because they are born further north.*" (participant #13, Dettah, woman).

Unfortunately, none of the participants in this study stated that they would be willing to accept the loss of prey on a trapline to wolverines in order to avoid conflict with this species. Half of the respondents thought the only solution would be to kill any wolverines jeopardizing their trap line while 25% believed the best strategy would be to attempt to make traps resistant to wolverine predation or to check traps more often to reduce losses (9%). Nearly one fifth of the participants (18%) thought the government should give monetary compensation for losses sustained on a trapline due to wolverine predation. None of the respondents believed that scare tactics would be effective at deterring wolverines. Of interest here could be incentives in the form of conservation performance payments, which provide payments (monetary or in-kind) to individuals or groups with the value of such payments determined based on specific conservation outcomes (Albers and Ferraro 2006, cited in Zabel & Holm-Muller, 2008, p. 247); thereby offering an alternative to loss compensation schemes. Since 1996, in Sweden, conservation performance payments have been given to reindeer herders to compensate for potential losses due to the presence of wolverine and lynx offspring produced in the area (Zabel & Holm-Muller, 2008).

Human-wolverines conflict mitigation efforts should be accompanied by environmental education efforts that aim to increase tolerance for wolverines. For example, several participants felt it was important to demystify the wolverine:

> *They are many stories about people in Canada, from different places, mostly English people that talk about wolverine as being very dangerous, vicious, and they attack people. They say it is not good to run across a wolverine in the bush, because you might get trouble. A lot of that is not true. I used to live in the wilderness with 11 sled dogs for 9 years. […]I was not attacked there, for 9 years I trapped there and lived there and I had lots of encounters with wolverines over the years. But not, in 40 years to this days, none of the wolverines have attacked people.* (participant #8, Ndilǫ, man).

According to Pearson (2016, p.367): "*arguments for conservation are also commonly associated with ecosystems, particularly the natural beauty of wilderness*." and many of the participants in this study described wolverines as belonging to the wilderness:

> *They [wolverines] should be free to come and go. You can't keep them prisoner in one place […] Out in the wild. It's their home. We are the*

> *people who are invading their territories. When we're out in the wild, that's not our home. We're living there for a certain amount of time but they are there all the time.* (participant #2, Fort Smith, woman).

Another Elder shared that:

> *[…] the animals […] this land on the whole of the northwest territories, that's their home. We are the people who are invading their territories. If you want to preserve the ecology and that, you have to take it, and you have to work with it. You have to balance things for it. If you take it and you put it in containment, you're killing its spirit and you aren't doing any good for yourself.* (participant #6, Fort Smith, woman).

5.4 Conclusion

Dene and Métis hunters and trappers hold deep knowledge about wolverines. Values associated with the species were diverse: people expressed admiration toward this species; even though they also described the wolverine as a trickster and a thief. Members of the Dene and Métis Nations in the NWT are well aware of the importance of this species in the socio-ecological system and observe the cumulative impacts that both climate and landscape change have on wolverine habitat and population dynamics. Managing conflicts with carnivores requires an understanding of the way local people interact with them. By listening to Elders, hunters, and trappers, we have a valuable way to gain a thorough understanding of human-animal relationships and human-wildlife conflicts. Managing wolverine populations efficiently will require taking habitat requirements into account along with local knowledge and observation in addition to scientific knowledge. Conducting community-based monitoring of wolverine populations, as has been done by the Arviat Hunters and Trappers Organization (Arviat HTO, 2014-15) which drew on the knowledge and skills of local wolverine harvesters who were recognized by their respective communities as highly skilled and respectful hunters and trappers can be an inspiring step forward and a valuable addition to any science based monitoring program.

La bibliographie relative à cet article se trouve à la fin dans les références

Chapitre 6 Children's perception of wolverine in the North Slave Region of the Northwest Territories, Canada

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Contributions des auteurs

Mise en place du protocole de l'étude (Morgane Bonamy)

Collecte des données (Morgane Bonamy, Andrew Harbicht)

Analyse des données (Morgane Bonamy, Andrew Harbicht)

Interprétation des résultats (Morgane Bonamy)

Rédaction du manuscrit (Morgane Bonamy)

Commentaires et correction du manuscrit (Morgane Bonamy, Andrew Harbicht, Thora Herrmann)

Afin de répondre au deuxième sous objectif qui était de comparer le degré de connaissance et la perception que les jeunes issus de milieux ruraux ou urbains détiennent sur le carcajou dans les Territoires du Nord-Ouest, dans la région North Slave, nous avons ciblés les enfants des écoles élémentaires des Territoires du Nord-Ouest. Puisque les jeunes générations seront amenées à supporter les programmes de conservations sur le long terme, il paraissait particulièrement intéressant de comprendre la perception du carcajou chez les enfants dans les relations humanimales.

6.0.1 Abstract

The public's level of knowledge and opinions towards certain species can greatly impact their willingness to support present or future conservation or management programs. When public opinion is mixed, as is often the case with wild carnivores, an accurate assessment of perceptions and knowledge can identify areas of concern and help guide public outreach efforts. When such outreach programs focus on children they can be particularly effective for two reasons: 1) the opinions of children towards wild animals are often more flexible than the ingrained beliefs of adults, and 2) it is the younger generation that will be called upon to support long-term conservation efforts in the future. To assess the degree of knowledge and the current state of opinion among children towards a little known and often negatively perceived Arctic species, the wolverine (*Gulo gulo*), we conducted surveys with school children between the ages of 8– 12 years old in seven schools within the North Slave Region of the Northwest Territories. Results from 151 completed surveys confirm that the majority of children lack general knowledge about this species, though the overall level of knowledge was higher in small, rural communities than the larger capital city of Yellowknife. Negative values were among the most commonly expressed values we observed, but so too was an appreciation for the ecological role that wolverines play in nature. The results of this study can be used to implement new educational programs aimed at increasing the overall level of acceptance of the wolverine and similar carnivores, and to encourage the public's willingness to support conservation efforts for this often negatively perceived species.

6.0.2 Résumé

Le niveau de connaissances et d'opinions des populations au sujet d'une espèce donnée peut avoir une grande incidence sur les programmes de gestion ou de conservation actuels ou futurs de l'espèce en question. Lorsque l'opinion publique est mixte, comme c'est souvent le cas avec les carnivores sauvages, l'évaluation précise des perceptions et des connaissances peut permettre de déterminer les sujets de préoccupation et de guider les efforts de sensibilisation du public. Quand de tels programmes de sensibilisation visent les enfants, ils peuvent être particulièrement efficaces pour deux raisons : 1) les opinions des enfants envers les animaux sauvages sont souvent plus flexibles que celles détenues par les adultes, et 2) c'est

la jeune génération qui sera appelée à soutenir les efforts de conservation à long terme. Pour évaluer le degré de connaissances et les opinions actuelles des enfants envers une espèce arctique peu connue et souvent négativement perçue, le carcajou (Gulo gulo), nous avons mené des enquêtes auprès d'élèves de huit à douze ans dans sept écoles de la région North Slave des T.N.-O. Les résultats des 151 questionnaires remplis confirment que la majorité des enfants possèdent peu de connaissances générales sur cette espèce, bien que le niveau global de connaissances était plus élevé dans les petites collectivités rurales que dans la capitale de Yellowknife. Les valeurs négatives figuraient parmi les valeurs les plus courantes exprimées dans le cadre des enquêtes, bien que la valeur écologique du rôle du carcajou dans la nature ait également été mise en évidence. Les résultats de cette étude peuvent être utilisés pour mettre en œuvre de nouveaux programmes éducatifs visant à accroître le niveau général d'acceptation du carcajou ou d'autres carnivores de ce genre, ainsi que pour encourager le public à soutenir les efforts de conservation de cette espèce souvent mal comprise.

6.1 Introduction

Tolerance, acceptance, and understanding by the general public are among the most important requirements of biological conservation programs, especially those dealing with controversial species such as carnivores (Bath & Enck, 2003; Kellert, 1985). At the individual level, these qualities develop from one's culture and first-hand experiences and have a strong influence on the perceptions, affection, sympathy, and ultimately the attitudes of people towards wild animals (Prokop & Tunnicliffe, 2010; Serpell, 2004). Initially, these attitudes develop during childhood and are malleable, shifting and changing as new experiences are accumulated (Paul & Serpell, 1993). Over time, however, certain opinions are reinforced and can become engrained as adults (Bjerke, Ødegårdstuen, & Kaltenborn, 1998).

When attitudes towards a particular species are primarily positive, conservation efforts for that species can be facilitated by widespread public support in the form of financial donations or volunteer participation in conservation programs (Bagchi & Mishra, 2006; Ceríaco, 2012; Knight, 2008; Stokes, 2006). When public opinion is negative, however, common distrust/dislike or negative experiences with a particular species (Kretser et al., 2009), regardless of its ecological importance, can hinder each step of a conservation program

(Treves & Karanth, 2003). This is more common among rural than urban populations (Schwartz, Swenson, & Miller, 2003) as the financial cost associated with wild animals interactions, the loss of livestock to a wild carnivore for example, is felt more strongly by rural ranchers and farmers than urban residents (Treves & Karanth, 2003). When the costs, or perceived risks, associated with the presence of wild carnivores exceed some threshold, public resistance to conservation efforts may escalate from complaints to poaching or poisoning efforts (Oli et al., 1994; Treves et al., 2004).

An example of the impact that negative public opinion can have on conservation efforts can be seen with the reintroduction of grey wolves (*Canis lupus*) into Yellowstone National Park in Wyoming, USA. In an effort to control local herbivore populations and restore ecological balance to the park, the National Park Service (NPS) began a wolf reintroduction program in 1995 (Brian, 2004). Though considered by many to have ultimately been a success, this reintroduction program was highly controversial (Fritts et al., 1997) and initially met with strong resistance and hostility from local inhabitants who expressed concerns for the safety of their families and livestock through various media outlets (Williams et al., 2002). As a result, reintroduction efforts were, at first, unpopular and were occasionally hindered by local inhabitants taking direct action to prevent wolves establishing themselves (i.e. poaching and poisoning; Sacks, Blejwas, & Jaeger, 1999; Treves et al., 2004). For reintroduction efforts to ultimately succeed, it was necessary for the NPS to spend considerable financial resources on media coverage and public outreach programs to improve public opinion towards grey wolves in the area (Wilson, 1997). Such scenarios are not unique to Yellowstone National Park, however, and similar situations occurred elsewhere, e.g. the reintroduction of wolves into Algonquin National Park, Ontario, Canada (Musiani & Paquet, 2004).

Negative public opinion towards carnivores not only arises from negative direct experiences, it can also stem from beliefs rooted in myths, or stories (Ceríaco, 2012). Such beliefs, though not necessarily based on the species' biology, can similarly result in their persecution (Ceríaco, 2012; Kellert, 1994; Kellert, Black, & Rush, 1996; Morzillo et al,2007). When traditional legends, myths and stories falsely imply that a species represents threat to public safety, livestock, or property, this idea can become ingrained among the beliefs of local

populations (Bjerke et al., 1998). In such situations, negative beliefs about a species can influence public opinion to the same extent as negative first hand experiences.

For these reasons, understanding public opinion towards a species of conservation concern, and the underlying causes for such beliefs, is crucial when planning and implementing conservation efforts. Past studies have shown that knowledge of people's beliefs, values and attitudes can be a valuable tool for predicting their future behaviour (Bright et al., 2000; Dayer et al., 2007; Fulton et al., 1996; Herrmann et al., 2013; Kellert & Westervelt, 1984). Indeed, some studies, e.g. Kellert & Westervelt (1984) and Vermeulen & Koziell (2002) have developed typologies or categories to quantify the expression of value orientations towards animals or even biodiversity among local populations. Conducting such public opinion studies prior to planned species reintroductions, can help biologists avoid costly and counterproductive mistakes (Fulton et al., 1996; Kellert & Westervelt, 1984). Additionally, in the event that negative public opinion towards at-risk species is present among the local population, identifying the underlying causes for such beliefs can help with the planning of public outreach and education programs (Linnelle, Swenson, & Anderson, 2001). Currently, education and habituation during adolescence are believed to be the most effective means of modifying public opinion towards carnivores and dispelling fears associated with such species (Davey, 1994; Mannelqvist, 2010; Münchhausen & Herrman, 2007). For this reason identifying demographic groups among the younger generations, where public opinion is more malleable, may improve the chances of successfully raising public opinion prior to conducting costly, but necessary, species conservation programs.

In rural southern regions, where human population densities are higher and much of the wild landscape has been converted for agricultural use, the public opinion towards reintroducing wild carnivores tends to be low (Campbell & Alvarado, 2011; Treves et al., 2006). In more northern latitudes, however, public opinion is more often mixed as the mostly rural populations can view wild carnivores as anything from a threat to livestock or valuable wild herbivores (ex. reindeer/caribou) to a valued natural resource themselves (fur trade or ecotourism). Coincidentally, as environmental changes and anthropogenically driven habitat loss continue to cause demographic declines in many northern species (Ogada et al., 2003; Vors & Boyce, 2009; Woodroffe et al 2005a, 2005b) the need for conservation programs at

the northern latitudes is growing (Weir et al., 2007; Woodroffe, 2001) emphasizing the need to better understand public opinion towards species at risk.

The wolverine (*Gulo gulo*) is a northern species with an important ecological role and which is currently in need of human intervention (e.g. management and conservation programs) to prevent the loss of additional populations and restore their densities throughout their historic range (Fortin et al., 2005). Entire populations have already disappeared from their historic distributions in eastern Canada (Fortin et al., 2005; Gallant et al., 2016; Krebs & Lewis, 1999). Elsewhere, information on their actual numbers is lacking and wolverines are often considered to be a "species of least concern," which permits hunting and trapping activities to continue (Species at Risk Committee, 2014) , despite the undetermined sustainability of these actions. Presently, conservation efforts for wolverines suffer from low public support due, in part, to their elusive nature—making them largely unknown to most Northerners (Banci, 1994); as well, an abundance of stories, myths, and second-hand encounters exist, which place wolverines in a negative light. As few people know much about the biology and ecology of wolverines, and fewer still have encountered one, much of what people believe about this solitary creature originates in stories. Many such stories reinforce misconceptions about wolverines being dangerous and ferocious beasts (Seton, 1953), stealing from traplines, raiding food caches, and damaging unoccupied cabins (Banci, 1994; Hash, 1987). This reputation is particularly common among trappers (Banci, 1994), who may feel that wolverines threaten their livelihoods (Fortin et al., 2005).

Among people that have heard of wolverines, opinions can range from wolverines being a threat to the economically important and dwindling caribou stocks (Linden et al., 1994; Oli et al., 1994) to their being a valued resource themselves for their fur (Banci, 1994). Among the Dene First Nation in Canada's Northwest Territories (NWT), the wolverine is an important species that appears in many traditional stories that highlight its capability to survive, steal, or play tricks on people (Moore & Wheelock, 1990). Along with playing an important role in many myths and legends, the wolverine also has economic value to the Dene (Benson, 2014) and its frost-resistant fur is sought after by makers of parkas throughout the north. As a result, many Dene and other northern Indigenous peoples show a deep respect towards wolverines.

With the possibility of a new conservation programs for wolverines in the NWT in the near future, we attempt to assess public opinion among northern residents towards this species in order to provide biologists, conservation practitioners and decision makers with a means of identifying areas of concern where beliefs and opinions are particularly negative, and assist with tailoring educational programs to address any shortcomings in public knowledge. Generally, as first hand encounters with wildlife are more common in rural areas, we hypothesize that rural inhabitants may be more knowledgeable about wolverine biology and ecology than their urban counterparts. Conversely, as rural populations in the north tend to be more closely connected with the local wildlife through hunting and/or trapping, activities with which wolverines are believed to interfere with, we also expect rural inhabitants to express a more negative opinion towards wolverines relative to urban populations. Moreover, with many of the above mentioned stories exalting the wolverine's strength, determination, and aggressive behaviour it would not be surprising if the general public opinion towards wolverines tended to be negative.

To this end, we surveyed school children in the North Slave region of the Northwest Territories in both rural and urban settings to assess their levels of knowledge about wolverines and the value orientations they express towards this species. School children were chosen as public outreach programs have been shown to be more effective among children than among adults (Bjerke et al., 1998; Paul & Serpell, 1993). A second reason why we choose to work with children was the fact that their sensitivity to the environment, their experiences, and their actions in the environment are all early childhood processes which contribute to formation of life values (Eloranta & Yli-panula, 2005). Similarly Palmer et al. (1996) highlighted the role of experiences and activities in nature as being a key source of environmental responsibility, especially in early childhood. Using semi-descriptive statistical techniques, we assessed the relationships between demographic covariates and knowledge – value orientations towards wolverines. We similarly assessed the relationships present between the value orientations expressed by students and their knowledge of wolverines. By quantitatively characterizing these relationships, we provide federal and territorial conservation agencies with information to assist them in protecting this little known and often negatively perceived, but important scavenger.

6.2 Methods

6.2.1 Study Area

Classroom surveys were conducted in the North Slave Region of the Northwest Territories, an area extending northward from Great Slave Lake (Figure 6.1) and which encompasses 7 small, rural communities (< 2 500 inhabitants) of predominantly First Nations people, and the urban capital of Yellowknife, with over 20 000 inhabitants. While the entirety of the North Slave Region falls within the species distribution ranges of wolverines, they are rarely seen in the vicinity of Yellowknife, though exceptions do occur: a wolverine was seen close to an elementary school in 2016[25]. Such entries into the city are rare, however, and first hand encounters are far more common near smaller communities, especially in winter when the lakes and rivers freeze over, facilitating movement.

Between April and June 2014, school directors and teachers at the third, fourth, and fifth grade levels were asked whether their students would enjoy participating in a study about wolverines. Participation involved students (between 8 and 12 years old) completing a voluntary survey to assess their knowledge of wolverines as well as their value orientations towards this species. Following the survey, all students within a participating class were given a short multimedia presentation about wolverines which included a 10-minute documentary film and a question and answer period with the lead author. Of the nine elementary schools we contacted, seven agreed to have classes participate in the study. Due in part to the greater concentration of elementary schools in the capital, five of the seven schools that agreed to participate, were in Yellowknife: Mildred Hall, Allain St-Cyr, N.J. Macpherson, J.H. Sissons, and Weledeh. The final two schools were in outlying rural communities: Elizabeth Mackenzie school (Behchokǫ̀, 70 km from Yellowknife, < 2 500 peoples), and K'alemi Dene school (Ndilǫ, 3.5 km from Yellowknife, ~200 people). While a balanced design incorporating an equal number of rural and urban schools would have been preferable, participation in our study was voluntary and at the discretion of the individual students and teachers. The following results should therefore be treated with some degree of caution, though measures

[25] Brokman, CBC news 2016 (http://www.cbc.ca/news/canada/north/wolverine-lockdown-yellowknife-middle-school-1.3865011)

were taken to limit the effect of unequal samples sizes on our statistical tests. The rural areas (Ndilǫ and Behchokǫ̀) are known to contain a larger proportion of hunters than Yellowknife, as many families in these communities actively maintain their historic trap lines.

In accordance with our ethical permits issued by the University of Montreal ethics committee in February 2014 (CERFAS-2013-14-D, Annexe 7) and Aurora College in Yellowknife (licence number 15456, Annexe 8), the names of participating schools have been replaced by letters in the following analyses to maintain anonymity.

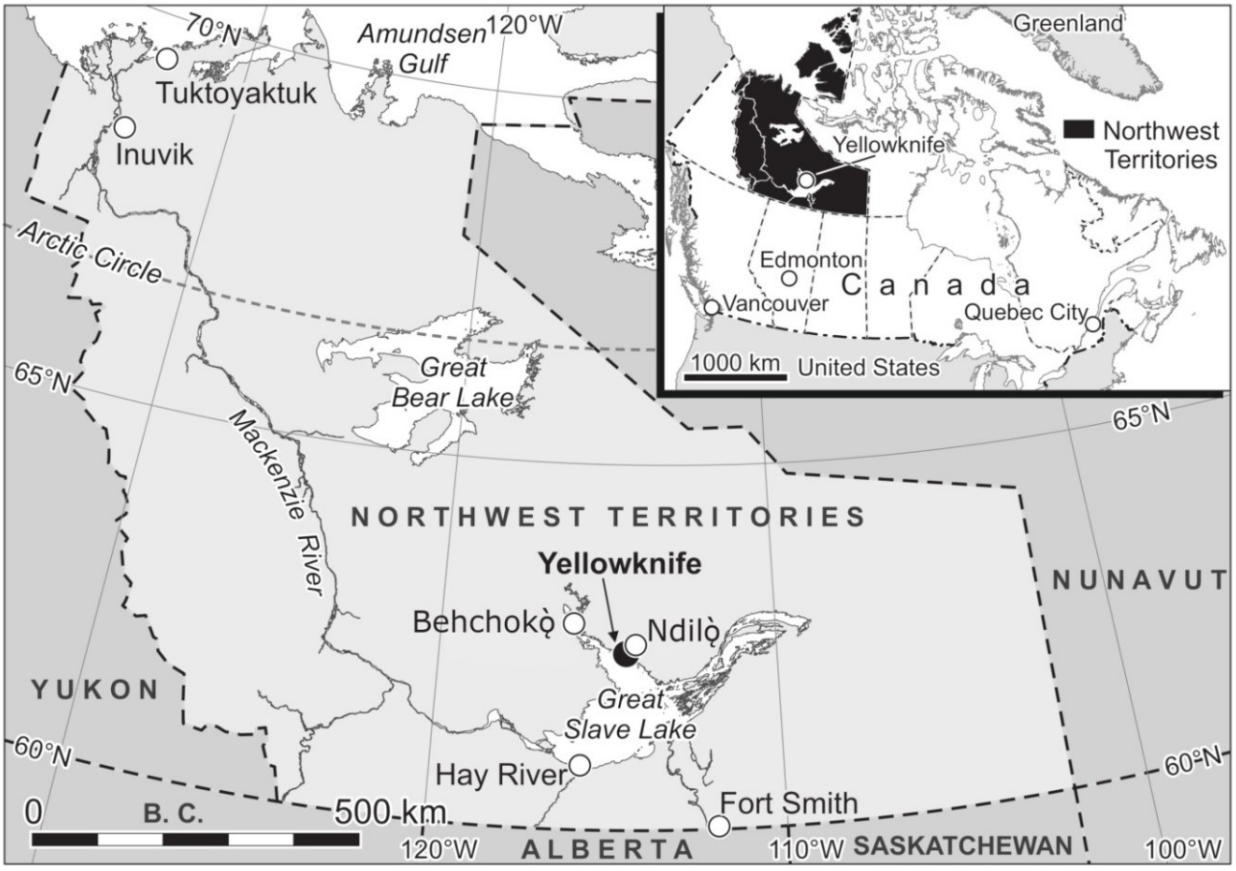


Figure 6.1: Location of the study area, North West Territories (source : Marc Girard et Morgane Bonamy, département de géographie Université de Montréal, 2019).

6.2.2 Study species

Wolverines, along with badgers, ferrets, otters, and weasels are members of the mustelidae family. They are carnivorous mammals whose adult weight ranges between 10 and 18 kg (Banci, 1994). Wolverines are native to the circumpolar regions, and are most often found in tundra, taiga, and boreale forest ecozones (Banci, 1994; Ruggiero et al., 2007) where human activity and landscape transformation is minimal (Banci, 1994; Copeland, 1996; Weaver et al., 1996). They are opportunist carnivores that regularly feed on both live prey as well as the carcases of dead animals (Persson, 2003). During winter, ungulates like caribou are their principal food source (Inman et al., 2012; Mattison, 2011; Mulders, 2001; Van Dijk et al., 2008) while in summer their diet shifts towards small rodents (Dalerum et al., 2009) and eggs (Myhre & Myrberget, 1975).

6.2.3 Survey

Children in classes that participated in the study (Table 6.1) were each given a questionnaire and informed that participation was not mandatory, nor would the results affect theirs school grades (Annexe 3). Children were then told that the purpose of the survey was to determine their feelings and knowledge about animals in general, but specifically about wolverines. Among the classes that chose to participate in the study, the student participation rate was 100%.

The questionnaires were composed of four sections, the first of which collected demographic information about each participant. This information included their location (rural or urban), age, sex, identity (Indigenous or non-Indigenous), school (A through G) and whether they had a domestic pet at home (yes/no). These data, along with the scores earned on the ‘general knowledge of northern species’ section of the questionnaire, served as covariates for models that attempted to explain variation in knowledge and the expression of value orientations related to wolverines.

Table 6.1: Demographic breakdown of classes (grades 3-5) surveyed within the Northwest Territories about wolverine and northern species in general.

School	Location	Class size	Indigenous (%)
A	Yellowknife	15	0
B	Yellowknife	26	7.7
C	Yellowknife	22	0
D	Community	11	100
E	Yellowknife	21	81
F	Yellowknife	43	7.0
G	Community	13	84.6

Identification as being Indigenous or not was at each student's discretion.

The next two sections of the questionnaire were the basis for assessing the students' knowledge levels about northern species and wolverines. The second section of the questionnaire asked students to identify the names of several northern species found within the NWT ranging from large charismatic species like the polar bear and caribou, to less known and cryptic species such as the lynx and arctic fox. These questions required students to match the names of species to their pictures. The third section dealt specifically with wolverines and quizzed the student's understanding of general wolverine biology (diet, habitat, mode of locomotion, and physical appearance) asking students to identify pictures of wolverine anatomy, prey items, tracks and habitat from among several choices.

The final section of the survey assessed the children's value orientation towards wolverines and consisted of ten closed-ended questions requiring one-word or one-sentence answers intended to address eight specific value orientations, based on Kellert's (1984b) study on children's attitudes towards wild species (Table 6.2).

Though multiple empirical studies have developed typologies of attitudes towards animals (e.g. Ramsey, Hungerford, & Volk, 1989; Teel & Manfredo, 2009), we found Kellert's values (Kellert and Westervelt, 1984) to be the most consistent with what we hoped to examine. As has been pointed out by Lutz & Srogi (2010) and Dietz et al., (2005), however, Kellert's work is not without its criticisms as it stems from disciplines that do not traditionally address values research and is not grounded in the same theoretical or empirical literature. As

a result, the biological basis for Kellert's hypotheses may be difficult or impossible to test. Despite these criticisms, we have found that Kellert's values typology provides a useful tool to analyse how children's value orientations influence opinion towards an endangered species.

Alterations to Kellert's original typology were made for the current study to increase its appropriateness for the populations we surveyed (populations with a high proportion of First Nations people). Instead of Kellert's original nine values, we employed eight value orientations (Table 3) that omitted Kellert's *humanistic* and *moralistic* values and replaced them with a single new *environmental protection and awareness* value to assess the children's willingness to protect wildlife and their habitat. Additionally, Kellert's *ecologistic* and *scientific* values were combined into a single *ecological/scientific* value. Finally, a *cultural/ spiritual* value, based on the *cultural* and *spiritual* values described in Herrmann et al. (2013), was added.

Table 6.2: Value classification scheme used to assess the values and opinions of children in the North Slave region of the Northwest Territories between grades 3 and 5 towards wolverines, adapted from Kellert (1984) and Herrmann et al. (2013).

Aesthetic	The individual finds this animal visually appealing.
Cultural and Spiritual	The individual acknowledges (is aware of) the importance/role of this animal in stories, legends, art, etc.
Dominionistic	The individual believes that this animal plays the role of a resource over which humans have the inherent right to use (i.e. a game hunting species).
Ecological/scientific	The individual appreciates the role of this species in terms of biodiversity, showing appreciation for most species and acknowledging the importance of wildlife and their interactions.
EPA (Environmental Protection and Awareness)	The individual believes that animals, and their habitat, should be protected and shows motivation to assist in their protection.
Naturalistic	The individual shows respect and/or affection for this species and nature in general, and is interested in observing/interacting with this species in a natural setting.
Negativistic	The individual displays a willingness to avoid the species due to dislike or fear, and finds the species to be dangerous.
Usefulness	The individual recognizes a practical use for the species, i.e. as a source of fur.

6.2.4 Statistical Analysis

Surveys were first manually digitized and checked for completeness. Of the 171 surveys collected, 151 were complete and were used in the subsequent analyses. Following digitization, a knowledge score was then calculated for each student by summing the total number of points achieved over the 12 knowledge-based questions about wolverines in the third section of the survey. A maximum of 24 points was possible and students could score partial marks for most questions. The questions designed to assess the eight value orientations of interest did so by requiring binomial responses (yes or no) and explanations in which words or phrases consistent with the value in question were identified. As our goal was to describe relationships between the demographic covariates and both the knowledge scores and value responses, as well as the direct relationship between knowledge scores and values themselves, the Akaike information criterion (AICc) was used to identify sets of generalized linear models with comparable explanatory potential (Akaike, 1987).

The identification of model sets was done by first constructing a global model containing each of the explanatory covariates and, in the case with demographic covariates, pertinent interactions. The MuMIn package in R (Barton, 2019) was then used to contrast corrected AIC values (AICc) for the global model and all possible subset models nested within the global model, including univariate models and the null model. Subsequently, model sets were then ranked according to their respective AICc values and filtered down to only those models within two ΔAICc of the best model. This subset of models was then further filtered by identifying and removing models that contained uninformative covariates, nested models whose additional covariates failed to improve their AICc score (Arnold, 2010) or did not significantly reduce residual deviance as determined by likelihood ratio tests.

This process was conducted on the models of wolverine knowledge scores as a function of demographics as well as for each of the models relating the expression of value orientations to demographics. In each case, the final model subsets were compared to the null model using likelihood ratio tests; the implications of the best fit models were explored. In each case where demographic covariates were used to model observed variation, the initial global model always included an interaction between sex and age and an additive effect of the remaining six covariates. When the variation among knowledge scores was modelled as a

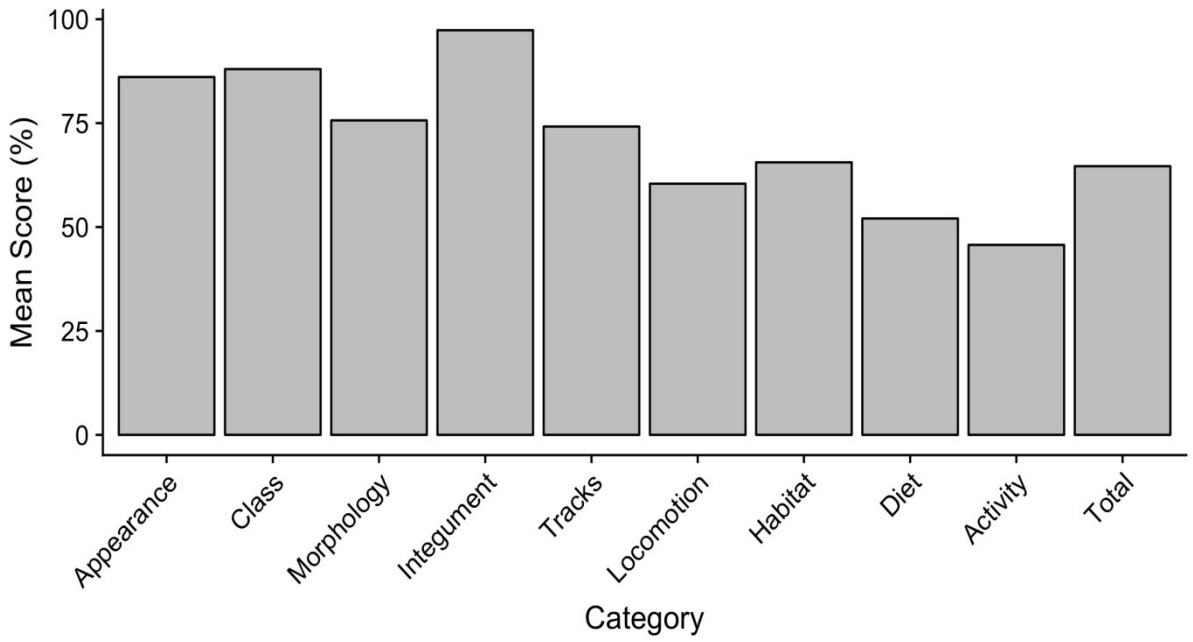
function of the expression of value orientations, all possible two-way interactions among values were considered.

6.3 Results

6.3.1 Knowledge of wolverines

6.3.1.1 Locomotion, Tracks, and Physical appearance

When students were asked to identify each of the wolverine's modes of locomotion from among several options, most children (94%) correctly answered that wolverines can walk, 57% recognized that wolverines can also climb, and 41% knew that wolverines are able to swim. When asked to identify which tracks belonged to a wolverine, 76% of the surveyed children (Fig. 2) answered correctly. When students were asked to identify physical attributes of wolverines from photos of possible answers, 97% chose the correct type of integument (fur), 75% of the children correctly identified the type of eyes a wolverine has, while 89% correctly recognized the jaw and teeth of a wolverine. Despite displaying a commendable understanding of the physical attributes of a mammalian predator, fewer than half (47%) were able to identify the claws of a wolverine. When asked to identify the main food sources of a wolverine from nine images, most students identified small rodents (69% chose lemming and 67% chose mice). Only 60% chose caribou despite caribou being the wolverine's primary food source in the NWT. Only 24% of the students correctly identified that wolverine eat carcasses, which suggests that the wolverine's role as a scavenger may not be well understood among students in the North. Overall, the average score obtained by children on the diet section was 50% (Figure 6.2). When four pictures of different habitats were shown to the students and they were asked to identify in which habitat they were most likely to find a wolverine, most children correctly answered that wolverine live in the tundra (68%) or the mountains (59%), which indicates that most students recognized the wolverine to be a northern species.



The survey covered all aspects of wolverine biology, including appearance, phylogenetic class (mammal, reptile, fish, etc.), aspects of their morphology (teeth shape, etc.), integument (fur, scales, etc.), means of locomotion, and paw shape. The survey also covered more general aspects of wolverine ecology, including habitat, diet, and whether the animals are diurnal or nocturnal (activity).

Figure 6.2: Students' average scores. The survey was designed for students in grades 3–5 in the NWT.

6.3.1.2 Diet/habitat

When asked to identify the main food sources of a wolverine from 9 drawn options, most students identified small rodents (69% chose lemming and 67% chose mice). Fewer, 60%, chose caribou despite caribou being the wolverine's primary food source in the NWT. Only one quarter of the students (24%) correctly identified that wolverine eat carcasses, suggesting that the wolverine's role as a scavenger may not be well understood among students in the north. Overall, the average score obtained by children on the diet section was 50% (Figure 6.2*)*.

When four pictures of different habitats were shown to the students and they were asked to identify in which habitat they were most likely to find a wolverine, most children correctly answered that wolverine live in the tundra (68%), or the mountains (59%), suggesting that most students recognized the wolverine to be a northern species.

6.3.2 Knowledge as a function of demographics

Including the global and null models, a total of 160 models were compared to one another in this analysis. From these, one best fit and 18 additional models within two ΔAIC were identified. The best fit model was an additive model containing the points received on the general knowledge section (points), and where the student lived (location, urban or rural) as explanatory covariates. The remaining 18 models contained both the points and location covariates, indicating that any contribution to improving the overall fit by additional covariates was marginal. For this reason only the best fit model is discussed further (Table 6.3).

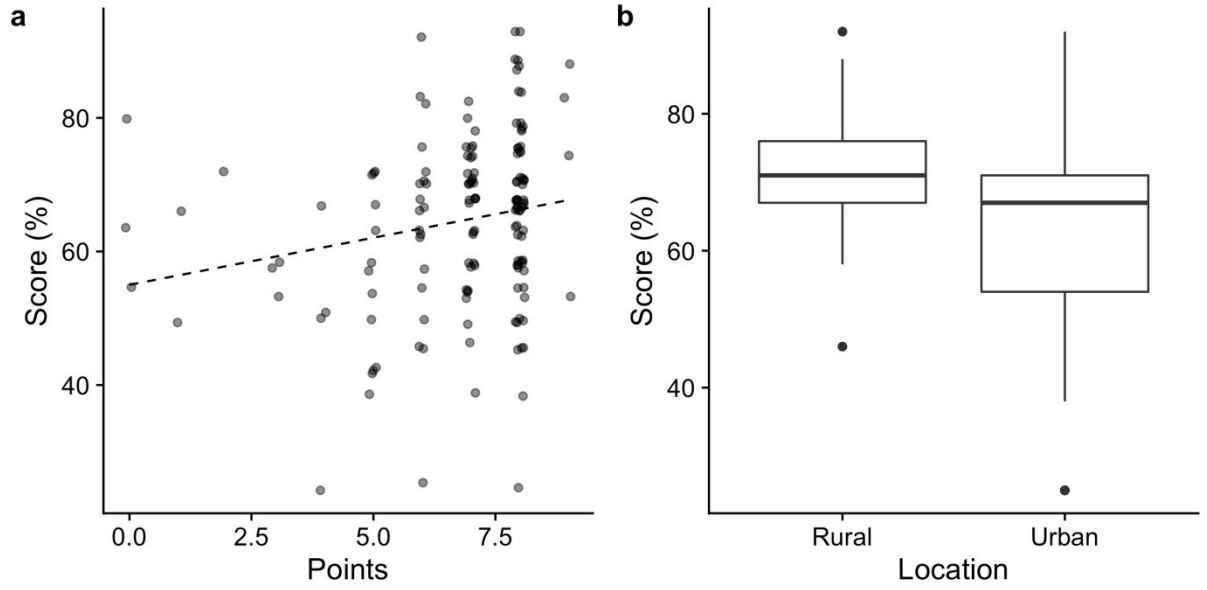
Table 6.3: Model selection table showing generalized linear models of student survey scores on general knowledge of wolverines.

Model	**K**	**LL**	**AICc**	Δ_{AICc}	w
*Points + Location**	2	-592.13	1192.53	0.44	0.04
Null Model	1	-599.38	1202.83	10.74	0.00

* indicates a significant difference from the null model based on likelihood ratio tests ($p < 0.05$).

Covariates included are the number of points received by participants on general knowledge of northern animal species (*points*) and whether participants lived in the capital city or outlying communities (*location*). The number of parameters (K) and the log likelihood (LL) of each model have been included along with their corrected AIC values (AICc), the difference between each model and the best fit model (Δ_{AICc}) and the AIC weights (w) assigned to each model based on the total set of models considered.

A likelihood ratio test indicated that the best fit model was a significant improvement over the null model ($p < 0.01$). In this model, scores on the general knowledge section of the survey were positively correlated with knowledge of wolverines in particular, such that each 1-point improvement on the northern species section raised the mean wolverine score by 1.4 points ($p = 0.02$). In addition to the effect of *points* on the wolverine scores, students in urban locations scored an average of 7.61 points lower than students in the outlying communities (Figure 6.3). This result is consistent with our expectation that students living in outlying communities experienced greater exposure to the wild and may therefore be more knowledgeable about wolverines than students in the capital city.



Lines represent values predicted by a fitted generalized linear model outlined in Table 5. Box-and-whisker plots include the median, first and third quartiles, and 1.5 times the inter-quartile range. Outlying points beyond this range are were still included in the analysis.

Figure 6.3 : The scores (%) obtained by children living in the Northwest Territories (grades 3 – 5) on a survey assessing general knowledge about wolverines, graphed as a function of general knowledge of northern species (out of 9) and whether the student lived in the capital city or an outlying rural community.

6.3.3 Value orientations

6.3.2.1 The aesthetic value

74% of the children surveyed expressed the aesthetic value (Table 6.4). Comments by the students typically concentrated on the fur of the wolverine, with many students described the wolverine as having nice, soft fur and a beautiful coloration. "*The wolverine is a pretty cool species.*" (Boy, 9 years old, non-Indigenous); "*Wolverines has a good color fur."* (Girl, 10 years old, Indigenous).

Table 6.4 : The overall expression (Exp) of values by the children surveyed about wolverines in the NWT.

Value	Exp	Model	K	LL	AICc	Δ_{AICc}	*w*
Aesthetic	73.70%	Null Model	0	-82.79	167.61	0.00	0.04
Cultural/ Spiritual	73.70%	Age + School*	2	-71.64	160.36	0.00	0.09
		Null Model	0	-83.79	169.61	9.25	0.00
Dominionistic	28.70%	Location + Points*	2	-73.24	152.65	0.87	0.06
		Age + Location*	2	-73.47	153.11	1.32	0.04
		Null Model	0	-88.15	178.32	26.54	0.00
Ecological/ Scientific	85%	Location*	1	-59.61	123.31	0.00	0.09
		Identity	1	-60.27	124.62	1.31	0.04
		Null Model	0	-61.72	125.48	2.17	0.03
Environmental Protection and Awareness	78.30%	School*	1	-66.79	148.40	0.00	0.05
		Location*	1	-72.39	148.87	0.47	0.04
		Identity*	1	-72.98	150.05	1.65	0.02
		Null Model	0	-76.53	155.08	6.69	0.00
Naturalistic	33.80%	Sex	1	-92.07	188.23	0.00	0.04
		Null Model	0	-93.16	188.35	0.12	0.04
Negativistic	89%	Age + Location*	101.364338	-45.04	96.25	0.00	0.11
		Null Model	109.736553	-50.23	102.49	6.24	0.00
Usefulness	83.30%	Pet	1	-63.34	130.77	0.00	0.06
		Null Model	0	-64.70	131.42	0.66	0.04

* indicates a significant reduction in residual deviance relative to the null model as determined by likelihood ratio tests ($p < 0.05$).

Best fit models explaining variation in the expression of the value are included along with the number of variables included (K), their log likelihood (LL), Akaike value corrected for small sample sizes (AICc), the difference between each model and the best fitting model (Δ_{AIC}) and each models AIC weight (*w*)based on the 320 different models assessed in each case.

6.3.2.2 Cultural and spiritual importance value

Despite the majority of students identifying as non-Indigenous, the cultural and spiritual value was expressed by nearly three quarters of the children surveyed (Table 6.4). In most cases, the expression of this value was through mentioning legends about wolverines interacting with people.

> *The Dene people used to live on the land. One day, a group of people were walking on the trail and [a] wolverine chase them. One man climb up in the tree and the wolverine tried to climb up the tree to get him and the man has a stick and hit the wolverine's toe. As he hit its toe […] it (wolverine) turned to spruce gum. It is one of the many wolverine legend stories told by the Dene people. My grandpa told me this story.* (Boy, 11 years old, Indigenous).

6.3.2.3 Dominionistic value

The Dominionistic value, or the idea that wolverines exist to be used by humans for their needs, was by far the least common value expressed by children in the survey. Just over one quarter of respondents expressed this value (Table 6.4), typically through mentioning that humans can impose their desires on wolverines: *"Humans need to teach the wolverine to not go inside cabins."* (Boy, 11 years old, non-Indigenous).

6.3.2.4 Ecological/scientific value

The ecological/scientific value scored highly among the children, with over four fifths of the surveyed children expressing this value (Table 6.4). Most students expressed that wolverines were somehow important to nature and the environment or that their interactions with other animals were important or necessary in some way: "*I knew wolverine is important, but I don't remember [why]… maybe for the environment*." (Girl, 9 years old, non-Indigenous)*, "Wolverine is important for other animals.*" (Girl, 11 years old, non-Indigenous).

6.3.2.5 Environmental Protection and Awareness (EPA) value

Like the ecological/scientific value, the environmental protection and awareness value also scored highly among children surveyed. Over three quarters of respondents expressed this value (Table 6.4), suggesting that even young children understand the importance of various

animals and that they believe the wolverine as a species that should be protected. Some even expressed concerns that without human intervention, wolverines may disappear.
"*If we don't protect the wolverine, it will die…*" (Girl, 12 years old, non-Indigenous).

6.3.2.6 Naturalistic value

Despite the tendency for surveyed students to understand the importance of biodiversity, nature, and to show an appreciation for the wolverine's role in nature, only one third of the children expressed the naturalist value in relation to wolverine (Table 6.4). This suggests that their appreciation of this species does not extend to a willingness to encounter a wolverine first hand and is potentially matched by a fear of them due to the stories they have heard. *"The wolverine is a big animal, it kills animals, his claws are very sharp…. The wolverine is big as a wolf.*" (Girl, 9 years old, Indigenous).

6.3.2.7 Negativistic value

Perhaps unsurprisingly due to the reputation of wolverines, surveyed students commonly expressed the negative value toward wolverines (Table 6.4). The expression of this value ranged considerably among schools, however, ranging from 30% to 100%. Students who expressed this value most often referred to the danger that wolverines can pose to human life, though few students actually mentioned direct attacks by wolverines against humans. Instead, most students commented on the wolverine's ability to steal food from humans.
"Back then, they would keep their food and the wolverine would steal their food like sugar, salt, meat and while they sleep, they would steal their food." (Boy, 9 years old, Indigenous).

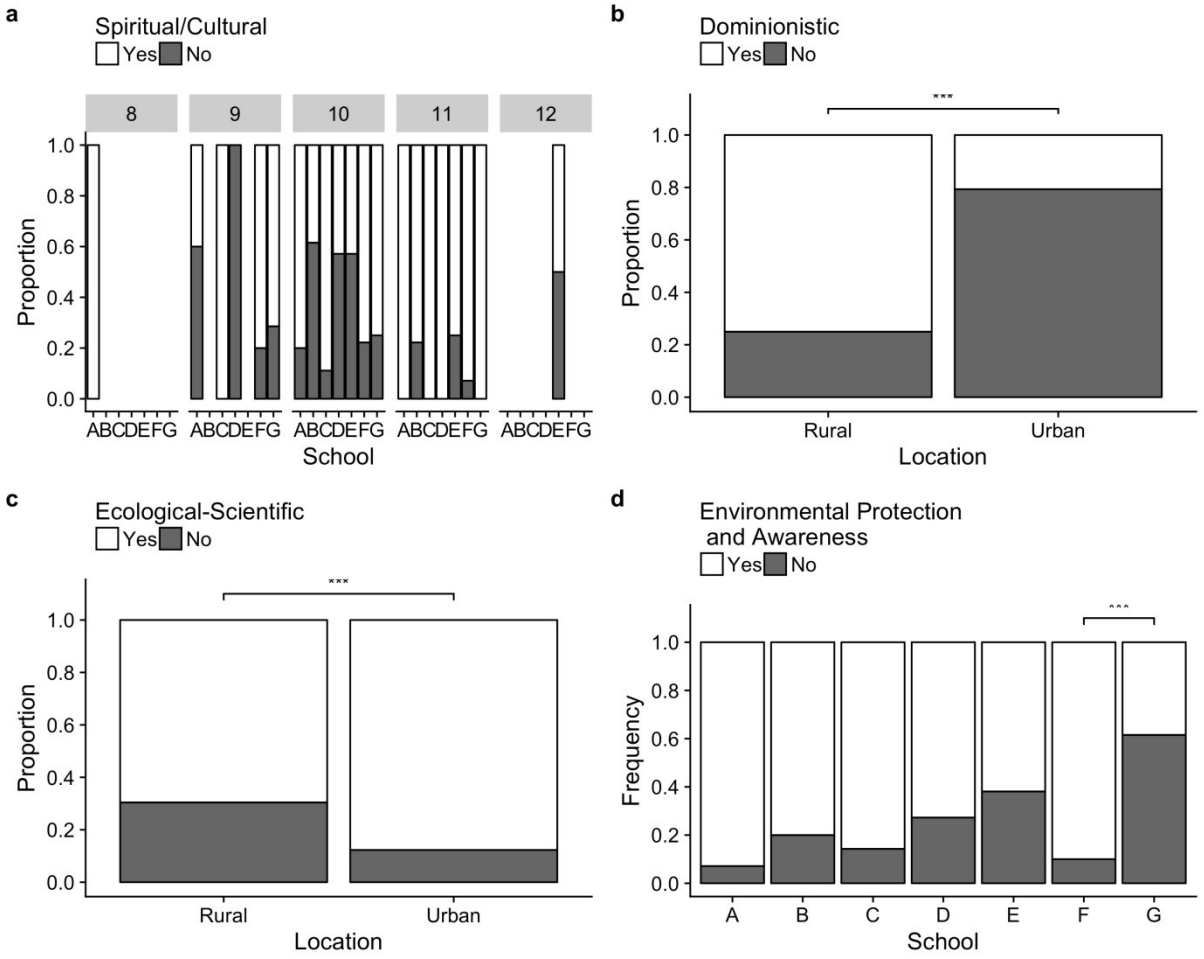
6.3.2.8 Usefulness value

Four fifths of the students surveyed expressed the usefulness value (table 6.4). The most common comment related to the usefulness of wolverines was in regards to the quality of the wolverine's fur and its practicality for the use of making clothing. "*A wolverine's fur is thick. It has black and brown fur on it. We use wolverine's fur for clothing. We use wolverine's bones to make Indian medicines."* (Girl, 11 years old, Indigenous).

6.3.4 Value orientations as a function of demographics

Despite a wide range of models being assessed, some of the values we tested displayed no significant interactions with any of the demographic variables we measured. One such value was the aesthetic value, for which none of the 160 assessed models outperformed a simple intercept model (the null model, Table 4). Similarly, while our analysis of the naturalist value returned a best-fit model with a lower (better) AICc score than the null model, this univariate model containing the sex variable was not a significant improvement over the null model according to likelihood ratio testing ($p = 0.14$) and was not considered further. Along with the previous two values, none of the demographic variables assessed were significantly correlated with the usefulness value. Of the 160 models assessed, only one scored a better AICc value than the null model, a univariate model containing pet, though this did not represent a significant improvement ($p = 0.09$).

The spiritual/cultural value, however, was associated with a demographic variable. The best-fitting model was a multivariate model containing the student's age and their school as explanatory covariates. A total of four out of 160 models were within two ΔAICc of the best fit; the remaining three models within two ΔAICc were all variations of the best model that included additional covariates deemed to be uninformative and were not considered further. A likelihood ratio test indicated that the best-fitting model statistically outperformed the null model ($p = 1.01 \times 10\text{-}3$) as well as univariate models containing either age or school alone ($p = 7.93 \times 10\text{-}4$ and 0.01 respectively). Within the best-fit model, only age had a significant effect on the expression of the spiritual and cultural value, resulting in children being 117% more likely to express this value with each additional year of age, regardless of which school they attend ($p = 0.01$, Figure 6.4a).



In each case, binomial generalized linear models were used to identify significant differences in the proportions of students expressing a value. In cell 'a', the significant effect lies within the age variable.

Figure 6.4 : The expression of values among children in the Northwest Territories towards wolverines as a function of their age and school (a), whether they live in the capital city or outlying communities (b, c), or their school.

Of the 160 models fitted to the expression of the dominionistic value, eight were within two ΔAICc of the best-fitting model. Among these, only two represented potential minimally adequate models without uninformative covariates: a multivariate model containing the location and points, and another containing location and age (Table 6.4). Both models represented a significant improvement over the null model ($p = 3.36 \times 10\text{-}7$ and $4.21 \times 10\text{-}7$, respectively) and in both, the location variable indicated that students in urban settings were 93% less likely to express the dominionistic value ($p = 1.11 \times 10\text{-}6$) than students in rural settings (Fig. 4b). In the best-fitting model, the points variable indicated that for each increase

of one point received on the general knowledge section of the survey, the expression of the dominionistic value decreased by 19%, a significant drop ($p = 4.8 \times 10\text{-}2$). The additional covariate in the secondbest model, age, did not have a significant effect on the expression of the dominionistic value.

Model selection on the variation in the ecological and scientific value indicated six models within two ΔAICc of the lowest AICc value. Of these, the univariate models containing location or identity were the only two minimally adequate models (Table 4). The strongest support was for a model containing location, which explained the observed variation significantly better than the null model ($p = 0.04$). In this model, students in urban locations were 212% more likely to express the ecological/scientific value than those in more rural settings ($p = 0.03$, Fig. 4c). In the second-best model, students' identities as Indigenous or non-Indigenous were correlated with the expression of this value, though this relationship was not significant and the model did not represent a significant improvement on the null model ($p = 0.09$).

With the EPA value, nine models were within two ΔAICc of the lowest AICc score, though only three represented minimally adequate models without uninformative covariates. Among those remaining models, the strongest support was for a univariate model containing schools (Fig. 4d). This model was significantly better than the null model ($p < 0.01$,), though subsequent post-hoc testing (Tukey's honest significant difference) only identified a single significant difference among schools in the expression of the EPA (F vs. G, Fig. 4d). The second-best model was a univariate model containing location, which also represented a significant improvement over the null model ($p = 3.4 \times 10\text{-}3$). In this model, students in urban settings were 300% more likely to express the EPA value ($p = 3.3 \times 10\text{-}3$). Finally, as with the previous two models, the third-best model was a univariate model that explained significantly more variation than the null model ($p = 7.7 \times 10\text{-}3$). In this model, identity was the only explanatory variable, indicating that non-indigenous students were over 300% more likely to express the EPA value.

Finally, for the negativistic value, only three of the 160 models tested fell within two ΔAICc of the lowest AICc value, with two of these representing nested versions of the third and best model. This best-fit model (Table 6.4) contained age and location as explanatory variables and represented a significant improvement on the null model ($p = 0.01$). Despite this

improved explanatory ability, both explanatory variables had non-significant relationships with the expression of the negativistic value.

6.4 Discussion

Our results indicate that among the younger generation of northern residents, as has been seen elsewhere throughout the wolverine' historic home range, this solitary species is largely unknown and maintains a negative reputation (Banci, 1994; Fortin et al., 2005; Riley, 2014; Ruggiero et al., 2007). While certain aspects of this species' biology and ecology, such as its appearance and habitat seem to be fairly well understood, what makes up the diet of this species is much less well known. Knowledge of wolverines was correlated with knowledge of northern species in general, but was also greater in rural communities than in the more urban capital city of Yellowknife. Similar differences were observed between rural and urban students in terms of the expression of values towards wolverines, with a more generally negative outlook being more common in rural than urban settings. These results are consistent with past studies on human interactions with wild carnivores, such as Heberlein (2012), who noted that people in urban areas of Sweden have a more positive attitude towards wolves than people in more rural areas where wolves have attacked or killed pets, livestock, and hunting dogs. Kleiven et al. (2004) similarly found that social acceptance of large carnivore behaviour is higher among urban than rural residents. The findings of this study therefore support the idea that any successful conservation efforts for this often- negatively perceived species will first need to address the public opinion through education and outreach programs.

6.4.1 General knowledge about wolverines

The level of knowledge demonstrated by the students we surveyed about wolverines was closely related to how much they knew about northern species in general, such as the caribou, polar bear, and arctic fox. This may reflect some students having a greater interest in biology and ecology in general, with wolverines making up a part of their environment, like any other northern species. Incidentally, knowledge about wolverines was also strongly linked to whether students lived and went to school in smaller communities, or the capital city. Children in smaller communities scored higher than those living in the capital city, despite all

schools in the Northwest Territories following the same curriculum, suggesting that they may be benefitting from external sources of education. This may arise from their closer physical proximity to nature or the greater connection that close acquaintances may have with local wildlife (e.g. trapping or hunting), elevating their overall knowledge of northern species through the direct or indirect transfer of knowledge (Bjerke et al., 1998; Ericsson & Heberlein, 2002; Lescureux et al., 2011; Patenaude et al., 2002).

In fact, in one of the rural schools surveyed, a local trapper had recently (earlier that school year) been invited to present their work to the students. Children in this school, therefore, had had a recent, albeit indirect, exposure to northern furbearing species. By interacting with someone who themselves has regular, direct contact with wolverines and other northern species, the children increased their level of knowledge. Indeed, this school demonstrated the highest scores on the knowledge section of all the schools we surveyed (data not shown). Alternatively, the small sample size in this school (n=13) could have resulted in a few children with a strong interest in wolverines having a larger overall effect on the class average relative to larger classes with 20+ students. This is unlikely to explain the effect of location, however, as both of the schools in the rural communities scored higher than the overall average.

Interestingly, whether a child had a family pet at home, a common proxy for interest in animals (Bjerke, Østdahl, & Kleiven, 2003; Prokop & Tunnicliffe, 2010), did not influence the degree of knowledge that children expressed towards wolverine and other arctic animals in general. This lack of a relationship was unexpected and contradicts previous works (Bjerke et al., 2003; Prokop & Tunnicliffe, 2010) that found that owning a pet increases a child's interest in nature and animals in general. While our study was not designed to address how interested a child is in nature, we can confirm that any impacts there may be from owning a pet do not result in increased knowledge about wild animals. One possible reason for this result may be that the children we surveyed were between 8–12 years old, while the Bjerke et al. (2003) study surveyed adults, and Prokop and Tunnicliffe (2010) surveyed children between the ages of 10–15 years old. There may, therefore, be an important effect of age, with older children drawing more similarities between household pets and wild animals than younger children. Future studies will be needed to confirm whether the impact of owning a pet on one's level of knowledge about wild animals is affected by one's age.

6.4.2 Value orientations assigned to wolverines

The most common values expressed toward wolverines among the children surveyed were the negativistic value and the ecological/scientific value while the dominionistic and naturalistic values were expressed least often (Table 6.4). In his 1984 study, Kellert also found that the dominionistic value was relatively infrequent, however, unlike our study, Kellert also found little support for the ecological/scientific value. One reason for this may be a rise in cultural popularity of the ecological/scientific value over the last 30+ years, reflected among our survey respondents. As the culture in North America changes with time, themes such as global warming and the importance of an ecological, holistic perspective of nature find their way into the curriculum, resulting in students having a better understanding about the key roles that various animals play in their environment. The differential expression of the EPA value across schools (Figure 6.4), however, suggests that school curriculum may not be the only factor influencing the expression of these values.

One key factor which influences the values children express towards wolverines is their location. Whether children lived in a rural or urban environment was associated with the expression of the dominionistic, ecological/scientific, environmental protection and awareness, and the negativistic values. This is perhaps due to the greater likelihood of having family members that hunt or trap fur-bearing animals in rural communities (Bjerke et al., 1998; Krange & Skogen, 2007). The importance of place for value orientation formation is also highlighted in the study by Hunter and Brehm (2004, p.17), which: "*revealed substantial linkages between rural residence, wildlife interaction, and development of perspectives with regard to local species*".

If current and future wolverine conservation efforts are to be successful, place-based value orientations and wildlife education programs will be needed, particularly among the younger generation, in order to increase knowledge and improve attitudes toward this species (Morgan & Gramann, 1989; Wilkinson, 1997). The needs of children will not be the same all over though, and efforts to improve overall knowledge should be focused in urban areas while efforts to improve public opinion should be concentrated in the rural communities. The Northwest Territories, where concerns have been raised about the lack of information regarding wolverine densities and the potential need for new conservation programs

(Boulanger & Mulders, 2013), can benefit from such a program in the coming years. If concerns regarding the decreasing abundances of wolverine in the area are validated, understanding the current level of knowledge and opinions of NWT residents towards this species would be a valuable initial step in the effort to conserve this ecologically important scavenger. Such knowledge in regards to the younger generations is perhaps even more valuable as the opinions of younger generations are more open to change, and today's youth that will be responsible for maintaining and supporting any new conservation programs in the future.

In most situations, more education does result in less fear and potentially more appreciation of a species; it is not always enough to raise public opinion though. One potential solution could be to shift education from the biology of a species to its ecology. Currently, many education programs only focus on the basic biology of a species, rather than its ecological role. When children are taught to think more about the role of a species in terms of biodiversity, it has been found to have a beneficial effect on the formation of positive attitudes (Prokop & Tunnicliffe, 2010). Our results may therefore represent an example, similar to that found by Reading & Kellert (1993) and Kleiman (1989), where very negative attitudes can be hard to change, but by explaining the ecological role of wolverine in the food chain, children may learn to appreciate the importance of wolverines and be more positive about this species.

6.5 Conclusion

This paper explored knowledge and attitudes towards wolverines among children in NWT in rural and urban landscapes. The results of this study show that knowledge about wolverine in the NWT by children is not evenly distributed among children in small communities and those in the city. Despite our sample sizes in the communities being lower than in the urban settings, the consistency of these findings with past studies support the idea that children living in small rural communities interact more with local wildlife and their environment, improving their knowledge about animals in general. These interactions, however, do not guarantee that wolverines are seen in a positive light. Indeed the negative

value was more often expressed towards wolverine in rural communities, suggesting that the interactions rural inhabitants have with wildlife may not always be a positive force for conservation, particularly when interactions include wolverines stealing food and bait from trappers (Banci, 1994). Though the children we surveyed were not trappers and did not experience negative conflicts directly, their opinions were still influenced by the stories they heard and the passage of information.

In cities, where the values expressed towards wolverine were generally positive, but knowledge was be lacking, educational programs may be the most effective means of raising public support for wildlife conservation programs. For example, Bogner and Wiseman (2004), describe the positive impacts of a week-long outdoor environmental education program on pupils' knowledge of conservation. They report shifts in adolescents' attitudes towards nature conservation with a higher preservation view on nature. Alternatively, in smaller rural communities where access to nature and the relationships with local wildlife are higher, knowledge may not be lacking and efforts should instead focus on improving the overall public opinion towards conflictive species. Improving our knowledge of and, in some cases, public opinion towards sensitive species, as may be the case for wolverines, will be important in order to resolve conservation tensions and make management plans socially more acceptable. How best to achieve this will likely vary from case to case and from culture to culture, and action plans should be adapted to each particular case and take into account that value orientations are place-based (Hunter & Brehm, 2004). Future research on this subject should expand on the sample size and locations, including more urban areas like Edmonton or Calgary, and more remote towns like Inuvik, Gaméti or Whati. Care should be taken to account for the new potentially confounding variables such an expansion would create however, like the effect of latitude, or whether students lived within or outside of the wolverine's natural range.

La bibliographie relative à cet article se trouve à la fin dans les références

Chapitre 7 How children in northern Canada represent the wolverine through drawings?

Morgane Bonamy, Thora Martina Herrmann

Cet article est en préparation pour soumission.

Contributions des auteurs

Mise en place du protocole de l'étude (Morgane Bonamy)

Collecte des données (Morgane Bonamy, Andrew Harbicht)

Analyse des données (Morgane Bonamy)

Interprétation des résultats (Morgane Bonamy)

Rédaction du manuscrit (Morgane Bonamy)

Commentaires et correction du manuscrit (Morgane Bonamy, Andrew Harbicht, Thora Herrmann)

Afin de répondre au sous objectif qui était d'identifier les représentations sociales du carcajou chez les jeunes de deux territoires: Les Territoires du Nord-Ouest où le carcajou est localement présent et le Nord du Québec où le carcajou est absent; nous nous sommes intéressés à la représentation de cet animal sous forme de dessins afin de comprendre la place du carcajou dans l'imaginaire, l'histoire et la culture chez les enfants.

7.0.1 Abstract

This study aimed to explore perceptions towards wolverines, a carnivore in decline in northern Canada, by Indigenous and non-Indigenous youth, the future generation of stakeholders. To accomplish this, we analyzed 165 drawings of wolverines collected from children in NWT where wolverine habitat overlaps urban areas, and in *Kawawachikamach* (QC) where the last wolverine sighting occurred over 40 years ago. Children drew wolverines in healthy environments, with only a minority choosing to depict the wolverine's environment negatively. Children demonstrated a basic understanding of wolverines and few significant differences were apparent in how the wolverine, as a species, was depicted. Dene children primarily drew wolverines hunting while Naskapi children preferred to represent the wolverine peacefully walking through its environment. Dene children also included morphological features consistent with a predator significantly more often than Naskapi children. These results indicate that, while information about wolverine habitat or biology is still being acquired by children in areas where wolverines no longer exist, the lack of exposure to this species may negatively influence their understanding of its ecological role. These results have implications for future reintroduction efforts and suggest that education programs may be necessary in order to gain public support.

7.0.2 Résumé

Le carcajou, important charognard dans les habitats nordiques, connaît un déclin dans la majeure partie du Canada. Des programmes de restauration et de réintroduction ont été proposés aux populations locales du nord du Canada, pourtant des informations manquent sur la façon de répondre à de telles initiatives. Comme les perceptions et les opinions des adultes ont tendance à être moins flexibles que celle des enfants, cette étude vise à explorer les perceptions envers les carcajous par les jeunes autochtones et non autochtones du nord du Canada, la future génération d'intervenant dans le nord.

Pour réaliser cette étude, nous avons analysé 165 dessins de carcajou d'enfants issus de deux groupes : sept écoles primaires des Territoires du Nord-Ouest, où l'habitat du carcajou chevauche des zones urbaines et un camp d'été à Kawawachikamach (Québec) où le dernier carcajou a été aperçu il y a plus de 40 ans.

Les enfants des deux groupes dessinent principalement des carcajous dans des environnements naturels, seulement une minorité a choisi de représenter le carcajou dans un environnement négatif avec des poubelles et des déchets dans le paysage. Les enfants des deux groupes ont démontré une compréhension basique de l'écologie du carcajou et ont représenté le carcajou dans un habitat approprié - principalement les forêts et les montagnes - mais des différences significatives étaient apparentes dans la représentation du carcajou, en tant qu'espèce.

Les enfants Dénés ont dessiné des carcajous chassant significativement plus souvent que les enfants Naskapis, qui ont préféré représenter le carcajou marchant paisiblement dans son environnement. Les enfants Dénés ont aussi inclus des caractéristiques de prédateur au carcajou significativement plus souvent que les enfants Naskapis.

Ces résultats indiquent que, même si les informations sur l'habitat et la biologie du carcajou sont toujours acquises par les enfants habitant des zones ou le carcajou n'existe plus, le manque d'exposition à cette espèce peut avoir une influence négative sur la compréhension du rôle écologique de cette espèce. Cela a des implications pour les efforts de réintroduction futurs et suggère que les programmes éducatifs sur le rôle du carcajou pourraient être nécessaires pour obtenir le soutien du public.

7.1 Introduction

The wolverine (*Gulo gulo*) is found throughout the circumpolar region (Kvam, Overskaug and Sørensen, 1988; Banci, 1994; Ruggiero *et al.*, 2007; Slough, 2007) and is a cultural keystone species to many indigenous peoples (Garibaldi and Turner, 2004). This carnivore plays a central role in many Indigenous societies as a spiritual animal, frequently portrayed in legends as a trickster hero and as a creator of the world (Moore & Wheelock, 1990; Savard, 1971, Peastitute 2013). The perpetuation of colonial policies and practices in many Indigenous Nations, however, threatens the transmission of intergenerational knowledge about such species through stories (Bates, 2009). In the Naskapi Nation, there has been pushback against this trend in an effort to maintain the tradition of story-telling through a variety of forms, such as radio programs, books (Peastitute, 2013), and public discussions about the cultural and spiritual role of animals. Such activities may be particularly important with regards to less common or threatened species such as the wolverine, whose distribution

has shifted and personal encounters are rare or non-existent, as is the case with the Naskapi. As a result, younger generations of Naskapi children may only learn about wolverines through stories past down from their elders.

Unlike western and northern Canada, where wolverines are still physically present in much of their historic home ranges, wolverines have become extirpated from Quebec and the rest of eastern Canada (Slough, 2007; COSEWIC, 2014). The disappearance of these eastern wolverine populations over 40 years ago has not been accompanied by a disappearance of wolverines from the minds of the public, however, and there are unconfirmed reports of tracks and sightings each year (Environment Canada, 2016). In Quebec, the social emotion associated with wolverines and the collective memory and social representations of this once common species have permitted a multitude of stories to persist to this day (Peastitute, 2013).

With climate change and increasing human activities altering the environment, many Arctic species have experienced similar decreases in abundance (Vors and Boyce, 2009) and this trend is by no means unique to eastern Canada. Wolverine abundances in western Canada have begun to diminish due to impacts of socio-environmental changes (Gallant et al., 2016; Kukka & Jung, 2016; Slough, 2007) and currently there are believed to be only between 3,000-6,000 wolverines still present in the Northwest Territories (NWT) - a decline of as much as 66 % for some regions between 2004 and 2011 (Species at Risk Committee, 2014). At present, uncertainty about these population estimates has prevented the development of conservation programs for wolverines, but should such programs develop in the future, knowledge of how people perceive this species would greatly help wildlife managers as public opinion is strongly correlated to the success of conservation programs (Kellert and Westervelt, 1984; Fulton, Manfredo and Lipscomb, 1996; Bright, Manfredo and Fulton, 2000; Decker, Lauber and William, 2002; Dayer, Stinchfield and Manfredo, 2007; Herrmann *et al.*, 2013; Nyhus, 2016). The attitudes that ultimately govern public opinion often form in early life and are typically maintained through adolescence and into adulthood (Eagles and Muffit, 1990). Hence, it is perhaps even more important to understand how young people discern species of conservation concern (e.g. the wolverine). It will, after all, be the younger generation that will support future wildlife conservation programs.

One means by which this can be accomplished is through the analysis of drawings. Analyzing drawings is a child-friendly method (Stokas *et al.*, 2016) commonly used to collect

information about perceptions towards species and their environment (Barraza, 1999; Boya-Busquet, 2008; Dai, 2017; Ehrlén, 2008; Eloranta & Yli-panula, 2005; Stokas et al., 2016; Villarroel et al., 2018). This method allows us to obtain information and opinions (Wallon, 2001) directly from a child in a way that most children find agreeable (King, 1995; Barraza, 1999; Eloranta and Yli-panula, 2005). Drawings also allow children to express themselves with a wide variety of media (e.g. felt pen, color pencil, paint, or markers; Summers-Van, 1984) and are a visual representation of what children think, feel, or perceive (Katz, 2017). The interpretations of drawings can also be used to compare issues related to children from different background (schools, communities, or nationalities) as it circumvents linguistic barriers (Chambers, 1983; Eloranta and Yli-panula, 2005). According to Thomas and Silk (in Barraza, 1999, p.50), *"Children's drawings provide a "window" into their thoughts and feelings, mainly because they reflect an image of his/her own mind".* There is disagreement among some authors, however as to the validity of comparing drawings among different cultural groups. Some argue that all children use the act of drawing to represent subjects similarly, regardless of ethnicity or nationality (Kellogg, 1970; Barraza, 1999): "*the art of young children everywhere is identical*" (Grieve & Hughes, 1990 cited in Barraza, 1999, p.51). Though they stipulate that similarity among drawings would also depend on the children's age as they acquire cultural knowledge as they grow. Conversely, others claim that: "*there are regional and cultural influences on drawings*" (Eloranta & Yli-panula, 2005, p.6) so that representations may differ due to cultural differences in how the children draw, rather than differences in the subject matter. If we assume the former interpretation of drawings is correct, as in Barraza (1999, 2001), then drawings represent a comparable metric of how children perceive the subject matter – as influenced by the views and perceptions of the people around them. It reflects the patterns of their cultural or societal values. Drawing is therefore a useful tool for gathering information about the mental representations of children while providing a glimpse of their cultural and societal values towards a species and its environment (Thomas and Silk, 1990; Hsieh and Tsai, 2017).

In the present study, we analysed drawings of wolverine by children in the NWT (Indigenous and non-Indigenous) and Indigenous children in Quebec with the goal of gaining a better understanding of how young people perceive the wolverine, a mammal little known to many (Woodford, 2014; L'Hérault, 2018). To our knowledge, no previous studies have

analyzed the representation of this particular species in such a way. While many people have heard of wolverines, a lack of knowledge about this species is relatively common among the general public (Fortin *et al.*, 2005; Woodford, 2014; Bonamy *et al.*, 2019), making it difficult to encourage public support for conservation measures related this species. Improving our understanding about social representations of wolverines under differing cultural and ecological situations can be valuable information where conservation efforts are required, as is the case with western and eastern Canada (i.e. the NWT and Quebec). With wolverine conservation efforts currently ongoing in some parts of Canada, and new programs proposed for others, it would be useful to understand how children who live with this carnivore and children who have only heard stories about it represent this species and its environment. Specifically, we hope to address the following questions:

1) How is the wolverine portrayed in drawings by Indigenous and non-Indigenous children?
2) In which kind of habitat are wolverines most often portrayed?
3) Are there any striking differences among the drawings of Indigenous children from areas of Canada with and without wolverines?

7.2 Methodology

7.2.1 Wolverine

Wolverines (Figure 7.1) are members of the Mustelidae family ressembling a large fisher. Their fur is dark brown/black with a lighter coloured stripe along each of their flanks that can range from yellow to white. Males weigh between 12 and 18 kg while females are generally smaller, weighing between 8 and 12 kg (Banci, 1994). Globally, they inhabit most circumpolar countries, living in the tundra, taiga, and boreal forests of North America and Eurasia (Banci, 1994; Ruggiero *et al.*, 2007). Wolverines are present in the wilderness of the North Slave region of the NWT, and occasionally approach habited areas[26] (Brockman, 2016).

[26] In the winter of 2016, a wolverine was seen in the city of Yellowknife near an elementary school. Children were temporarily forbidden from going outside during breaks in the school day. Sightings within cities or communities was rather uncommon.

In Quebec, wolverines have been extirpeted since the end of the 1980s[27] but were once common throughout the province, particularly in the northern regions.

Figure 7. 1: Photograph of a wolverine (Morgane Bonamy, zoo of St Félicien, 2016)

7.2.2 Study area and data collection

Drawings were collected between April 2014 and June 2014 in the NWT and in July 2016 in northern Quebec as part of a larger research project on the perceptions of wolverines by the general public. Upon completing a survey assessing their knowledge about wolverines and the values they associate with this species (Bonamy et al. 2019b), the surveys were collected and each child was provided with a blank piece of white paper for their drawing.

[27] Or at extremely low densities. Though some people report having seen a wolverine, no data, pictures or tracks have confirmed these reports (COSEWIC 2014, Environment Canada 2016).

Each child was given 30-45 minutes to complete their drawing and coloring material was provided.

In the NWT, seven elementary schools within Yellowknife, the capitol city, participated in the project (Mildred Hall, Allain St Cyr, N.J Macpherson, J.H Sissons, and Weledeh schools). In addition to these more urban settings, two elementary schools in Dene First Nations communities near Yellowknife also participated: Ndilǫ (K'alemi Dene school) and Behchokǫ̀ (Elizabeth Mackenzie school, Figure 7.2). In each school, one or two classes of grade 3, 4 or 5 children (aged 8-12) were chosen and a total of 141 drawings were collected.

Figure 7.2: Location of study sites: Yellowknife, Ndilǫ, Behchokǫ̀ and Kawawachikamach. (source: Marc Girard and Morgane Bonamy, Geography department, Université de Montréal, 2019)

In Quebec, drawings were collected from Naskapi children attending a summer day camp in Kawawachikamach (Figure 7.2), a community located 15 km from Schefferville, the

site of the last confirmed sighting of a wolverine in the province in 1978 (Fortin *et al.*, 2005). As with the schools in the NWT, drawings were collected from children between the ages of 8 and 12 years old following the completion of the same wolverine survey.

This study received approval from the Ethics Committee for Arts and Science Research of the University of Montréal (ethics certificate: CERFAS-2013-14-201-D[28], Annexe 7) and from the Aurora College in Yellowknife (permit number: 15861[29], Annexe 8). According to the requirements of the ethic certificate, prior authorisation from the directors and teachers of the participating schools and classes, respectively, was obtained as well as a prior authorisation from the participating First Nation communities and the director of the Naskapi summer day camp[30]. Participation was on a voluntary basis and children chose whether or not to participate. Following the methods used by past authors (Barraza, 1999; Brown, Henderson, & Armstrong, 1987; Myers, Saunders, Garett, & Erik, 2003; Stokas et al., 2016), all participating children were invited to draw a wolverine in its environment (Figure 7.3) in any situation they wished (Annexe 4). Between 30-45 minutes were provided for the completion of this task and children were free to choose any kind of color pen, felt pen and color pencil. In each case, information about the participants was collected including their age, sex, location, and self-identification as First Nation, Métis or non-Indigenous. To ensure that the meaning of the drawing was correctly and fully understood, children were asked to provide a short description of their drawing which was recorded as each child provided their finished drawing. The same methodology was applied in the two regions area and all data collection was done in a single session inside a class room.

[28] Voir annexe 7

[29] Voir annexe 8

[30] A summer camp is a day camp, where children can come during the day and do some activities with educators, (canoeing, drawing, painting, games… (our activity was include in the day summer camp)

Figure 7.3: Drawing of a wolverine (source: Christine Bonamy, 2013).

As children in Quebec were not expected to have ever seen a wolverine in real life, information was gathered about the kinds of stories related to wolverines they may have been exposed to. This was accomplished by surveying a sample of the local adult Naskapi population. Fifteen interviews were conducted among adults in the community during which we asked questions about wolverines addressing what they knew about this species and how wolverines were perceived. This information was used to assist in interpreting the drawings and captions of the children in Quebec. We also use 8 interviews collected in the NWT as part of another study in 2016 (Bonamy et al., 2019b) to help us to interpret the drawing in the Dene children. In each case, verbal or written consent was acquired from each interviewee as per our ethical permits.

7.2.3 Data Analysis

First, drawings were sorted based on whether they depicted only a wolverine or a wolverine together with elements of its habitat. Drawings were then codified by comparing each drawing and caption against a checklist to determine the presence of specified key elements within grouped into categories (Marquis, 2001). These elements included: a habitat

for the wolverine (e.g. a mountain, rocks, grassy hills, forest [31], pollution, water), vegetation types (e.g. tree, shrub, herb, flower, and grass), the presence of a wolverine burrow, and biotic elements (other animals, humans, or prey). Next, the different actions portrayed by wolverines within the drawings were classified (e.g. hunting or searching for food, fighting, eating, climbing, howling or making noise, swimming, sleeping, playing, or walking. Some youth described their wolverine as "doing nothing special" which typically featured the wolverine represented as being stationary in the drawing. This was also included as a potential activity. Wolverines were also classified as a predator if they were portrayed with one of three characteristic: blood, teeth, or claws.

In total, 165 drawings, both with and without the wolverine's habitat, were used to analyse social representations of the wolverine by children in northern Canada (Table 7.1). Later, to assess perceptions of wolverine in its environment, only drawings depicting the wolverine's habitat were used (n=114).

In subsequent analyses to assess for differences in the depictions of wolverines by First Nation children, drawings from Naskapi children in Kawawachikamach were compared to a subset of the drawings collected from the Dene children in NWT. This subset comprised only drawings by children who identified themselves as Dene and live in the small communities of Behchokǫ̀ and Ndilǫ (Table 7.2).

Table 7.1: The number of children's drawings (depictions of wolverine and portrayals of the wolverine's habitat from Western Canada and Eastern Canada).

	Drawings in NWT	Drawings in QC
Drawing only portraying the wolverine	40	11
Drawings including habitat	101	13
Total drawing	141	24

[31] more than two tree in the drawing were considering a forest

Table 7.2: The number of children's drawing (with and without habitat) among different First Nations in Canada.

	Drawings by Dene children	Drawings by Naskapi children
Drawings only portraying a wolverine	6	11
Drawing including habitat	18	13
Total drawing	24	24

7.2.4 Statistical Analysis

Due to the low number of observations in some of the categories examined, only a subset of the drawing elements were examined using Fisher's Exact tests of independence. This subset included the habitat variables: mountains, water, rocks, trees, forests and grassy hills, along with the presence of a prey species, the presence of carnivore characteristics, and the wolverine's activity. The demographic variables considered included the children's age and sex. An additional variable, identity (Indigenous or non-Indigenous), was also considered for children within the NWT. Each of the above mentioned elements were tested separately against the two or three demographic variables for Quebec or the NWT respectively. Bonferroni corrections were applied to the resulting p-values to account for repeat tests. In addition to the tests within each province or territory, each of the 10 drawing elements were tested for independence between the nationalities of Indigenous children (Dene or Naskapi). Post hoc pairwise Exact tests with Bonferroni corrections were used to identify the source of significant associations as required.

7.3 Results

7.3.1 Representation of wolverines by children in the NWT and Quebec

In the NWT, with the exception of the sex variable, there were no significant relationships between the demographic variables we collected (age, location, or identity – Indigenous or non-Indigenous) and the key elements within the drawings we collected. Sex was found to be associated with the inclusion of a prey species within the drawings as boys drew a prey item (typically being consumed by a wolverine) significantly more often than girls

(p=0.02, Fisher's exact test; Figure 7.4). Within Quebec there were no significant associations between the demographic variables recorded for children within the Naskapi community of Kawawachikamach and the key environmental or representational elements of their drawings.

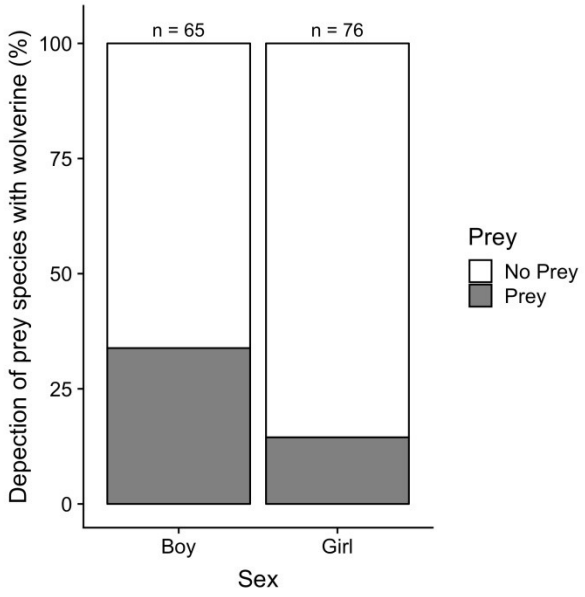


Figure 7.4: The percent of drawings from children in the NWT that portray a wolverine with a prey species.

7.3.2 Depictions of wolverines in children's drawings

7.3.2.1 Northwest Territories (all children32)

More than half of the children in the NWT (54%) did not seem to consider the wolverine as a predator and did not include claws, teeth or blood in their drawings. Among the remaining drawings, wolverines were portrayed with either sharp claws (27%), big teeth (32%), or both as in Figure 7.5A.

Despite being more common among boys than girls, the inclusion of prey species in the drawings was uncommon overall, with only 23% of the children in the NWT choosing to

[32] All children from NWT referred to Indigenous children and non-Indigenous children

include a prey item with their wolverine. Among those that did (n=33), the most common prey item was an unidentifiable dead animal (34%) while the next most common prey item was a rabbit (21%, figure 7.5A). Birds (9%), unidentifiable prey[33], mouse, and eggs were each represented in 6 % of the drawing's prey. Caribou, which are the wolverine's primary food source in the NWT (Mulders, 2001), were represented in only 3% of the drawings. Among the drawings that included a prey species, only 6% represented the wolverine with blood. The wolverine was represented as a solitary animal by most children and only 3% drew their wolverine with its family (cubs or partner). Finally, only three drawings included a human with the wolverine.

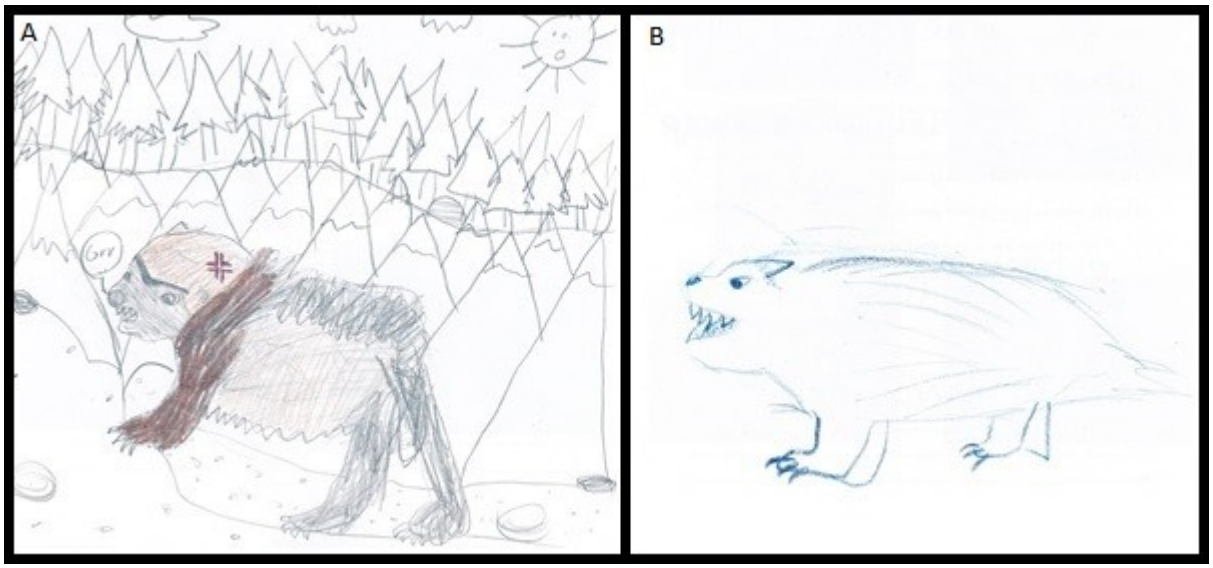


Figure 7.5:Drawings of a wolverine including predatory features in its habitat by Indigenous girls in Northern Canada. A) NWT, 10 years old, "The wolverine sees a little rabbit and goes after it"; B) QC, 9 years old, "The wolverine is defending himself against wolves".

7.3.2.2 Northern Quebec

Few children in Quebec (26%) included predatory features on their wolverine (Figure 7.5B). As with the NWT drawings, sharp teeth were the most common predatory feature,

[33] These prey were noted in the description of the drawing but was not apparent in the drawing, for example: "*my wolverine is hunting a prey in the forest"* (male, 8 years old, non-Indigenous) or it was not possible to distinguish what kind of prey

present in 36% of drawings that featured predator traits. Sharp claws were only present in 18% of the drawings and blood was not represented in any of the drawings. Among the drawings collected in Quebec, prey items were far less common; appearing in only one drawings (a wolverine consuming a poisoned fish). Not a single drawing collected from children in northern Quebec represented a wolverine with a human.

7.3.3 Portrayal of the wolverine's habitat in children's drawings

7.3.3.1 Northwest Territories (all children)

In the NWT, depictions of wolverine habitats were present in 72% of the drawings we collected (Table 7.1). Trees and shrubs (63%, Figure 7.7A, B) were the most common habitat feature included in the drawings collected in the NWT, with forest being present in 37% of the total. Rocks (31%) were the next most common feature (Figure 7.7A), followed by grassy hills (29%). Mountain were apparent only in 20 % of the drawings and few drawings contained an aquatic environment like a lake or river (11%). Some drawings represented a combination of features from different habitats like mountains and forest, or rocks and grassy hills and only 5% of the drawings included a wolverine's burrow.

In nearly every drawing where the wolverine's habitat was represented, children drew a pristine, natural environment, free from anthropogenic alterations (Figure 7.7A, B). Two drawing legends described the wolverine as being in a safe place or safe environment. A human impacted environment was only represented in a total of two drawings (Figure 7.8A, B). In two of these, children included garbage, litter, pollution, or deforestation in their drawings (no human were presents). Another 3 drawings included humans. In one, the wolverine was attacking the human, while in the second; the human and wolverine were fighting. The final drawing depicted the wolverine in the forest with the caption: "*Me, in the woods with a wolverine. I was walking in the woods and I saw the wolverine. So I went over to it and he was nice*" (girl, 10, Non-Indigenous).

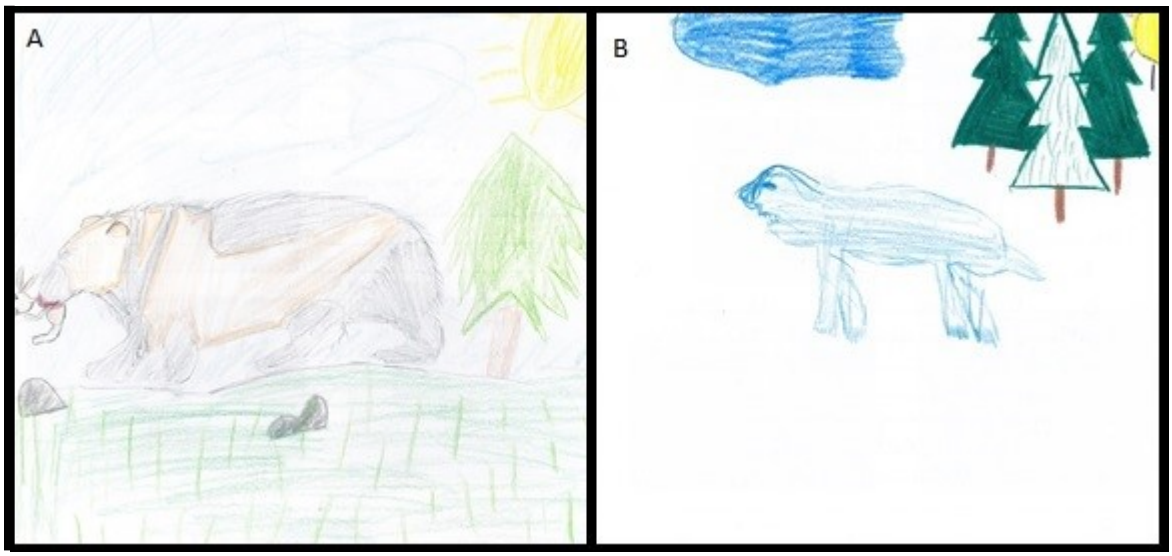


Figure 7.6: Drawings of a wolverine in its habitat by children in northern Canada. A) NWT, boy, 11 years old, non-Indigenous, “A wolverine who has caught a rabbit”; B) QC, girl, 10 years old, Indigenous, “A wolverine is walking in the forest”.

7.3.3.2 Northern Quebec

In Quebec, 54% of the drawings represented a wolverine in its environment (Table 7.1; Figure 7.6B). Forest was the most common habitat feature drawn with wolverines (62 %), and children in Kawawachikamach always drew more than one tree (Figure 7.6B and 7.7B). Far fewer children drew the wolverine in the mountains (Figure 7.9B) or included aquatic or grassy hill (23% each) habitats. Rocks and burrows were not present in any drawings. Anthropogenic influences, on the other hand, were present in 7% of the drawings we collected. These mostly took the form of litter (Figure 7.9A).

Figure 7.7: Drawings of wolverines in their habitat by 10 years old children in the NWT. A) girl, Indigenous "a wolverine in the mountain with tree"; B) boy, non-Indigenous "a wolverine walking around in the sun".

7.3.4 Wolverine activities

7.3.4.1 Northwest Territories (all children)

The most common activity for wolverines (Figure 7.10A) in the children's drawing was "*doing nothing special*" which was represented in nearly half of the drawings collected in the NWT (42%). Among the remaining drawings, 13% portrayed the wolverine as hunting or searching for food (15%, figure 7.5A, 7.9A). Only 10% of the drawings showed a wolverine actually eating something. The next most common activity was climbing (8%, Figure 7.7A). The remaining drawings represented the wolverine as walking (4%, Figure 7.6B), fighting (4%), swimming (2%), or howling like a wolf (2%). The remaining 1% represented the wolverine as playing or sleeping.

Figure 7.8: Drawings of wolverines in its habitat by non-indigenous children in the NWT. A) girl, 9 years old "It is the future: if we don't help wolverine. Wolverine is sick and dying" , B) boy, 10 years old, "the wolverine chases a mouse in a plastic bag".

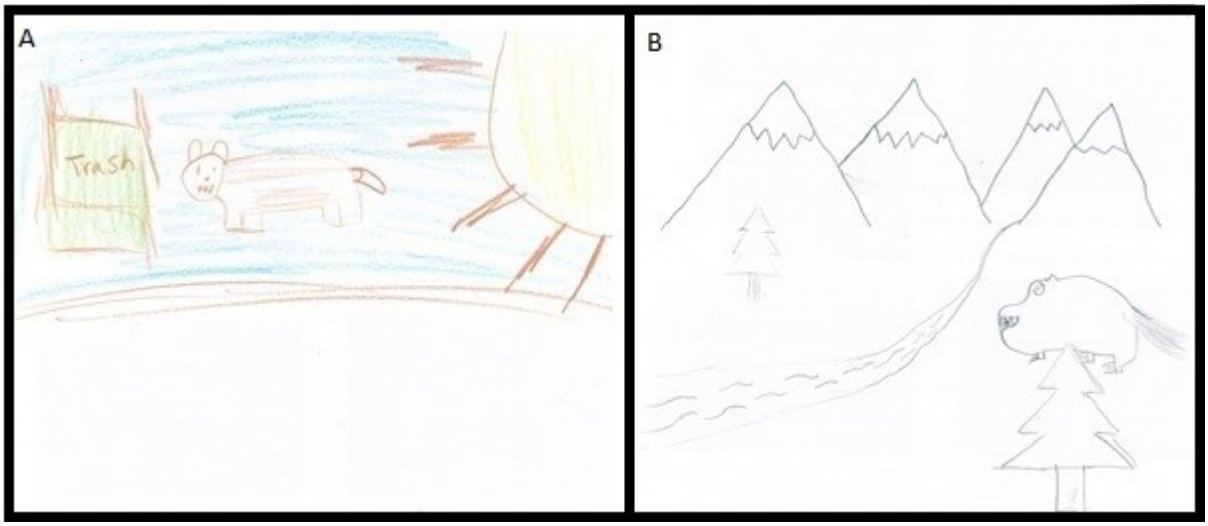


Figure 7.9: Drawings of wolverines in its habitat by children. A) NWT, girl, 12 years old, "it is a wolverine looking for food", B) QC, boy, 8 years old, "the wolverine is climbing a tree".

7.3.4.2 Northern Quebec

As with the NWT, the majority of the drawings collected in Kawawachikamach depicted wolverine as "*doing nothing special*" (38%, Figure 7.10B). The next most common activity was walking (29%), following by eating (13%). Climbing and swimming both

represented 8% of the drawing collected in Quebec (Figure 7.10B). Only one drawing represented the wolverine fighting (4%, Figure 7.5B). None of the children drew the wolverine howling, growling or sleeping. Hunting or searching for food, a fairly common activity among the NWT drawings, was also absent.

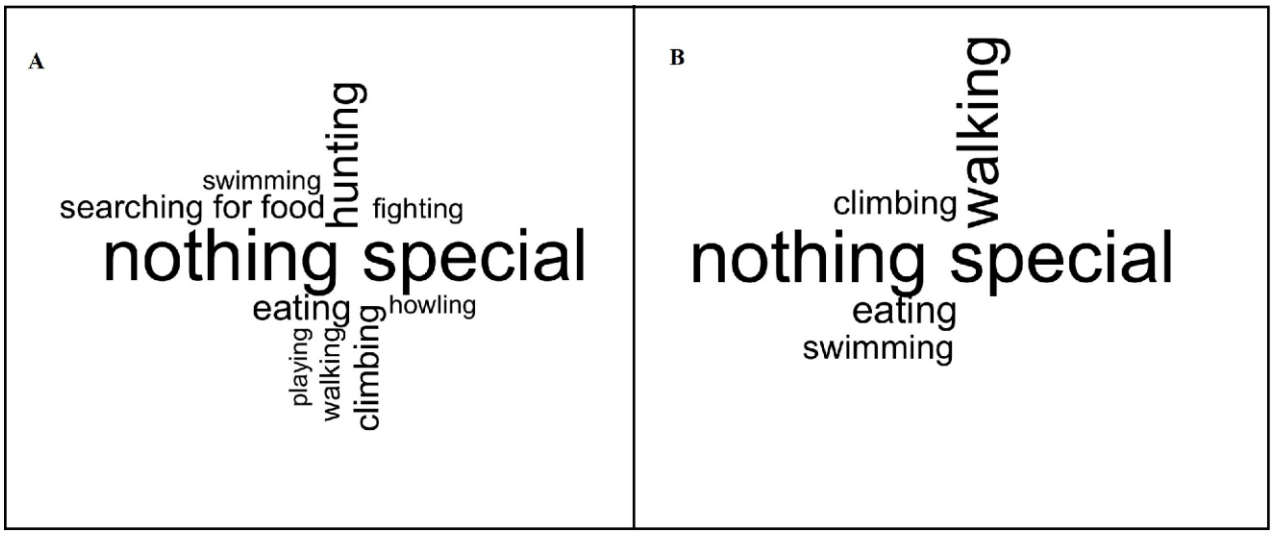


Figure 7.10: Word clouds where size represents frequency with which words were used to describe the wolverine's activity in drawings by Denes children in the NWT (A) and Naskapis children in Quebec (B). Activities must have been mentioned at least twice to be included in the figure.

7.3.5 Comparisons among Dene and Naskapi First Nations Children

We did not find any significant differences in the frequency with which Dene and Naskapi children represented the wolverine's habitat in their drawings (Table 7.2).

Table 7.2: Number of drawing by First Nation children in northern Quebec and the NWT.

	Dene children	**Naskapi children**
Drawings without habitat features	6 (25%)	11 (46%)
Drawings with habitat features	18 (75%)	13 (54 %)
Total	24	24

There were differences; however, in the way wolverines themselves were represented. Significantly more Dene children represented the wolverine as a predator in their drawings relative to the Naskapi children ($p = 0.039$, Fisher's Exact test; Figure 7.11).

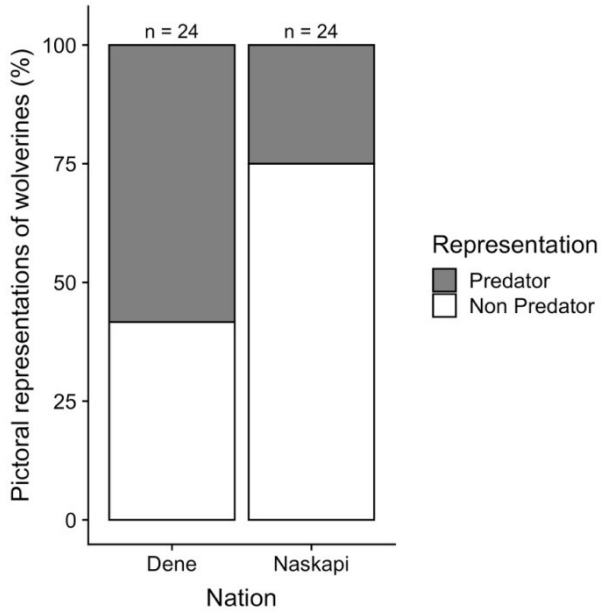


Figure 7.11: The percent of drawings portraying the wolverine as a predator by children from the Dene and Naskapis Nations.

This was also reflected in the wolverine's activities as Dene children drew the wolverine hunting while this activity was absent among the drawings by Naskapi children. Concurrently, Naskapi children drew the wolverine walking through its environment while this activity was not portrayed among Dene children's drawings. This reversal of activities among the two nationalities was significant ($p = 0.046$, Fisher's Exact test; Table 7.3).

Table 7.3: Comparison between Dene children's drawing and Naskapi's children drawing depicting the wolverine's activity and their percent of the total activities portrayed.

Activity	Dene	Naskapi
Drawings with hunting	5	0
Drawings with walking	0	7
% of total activities	21	29

Bonferroni adjusted P-value = 0.046; pairwise post-hoc test among activities (n = 35)

7.4 Discussion

In this study, we analysed 165 children's drawing from two different regions of Canada, one region where wolverines are still present and another where wolverines have not been seen since the 1980s. We found that children in both regions likely have a similar perception of wolverine habitats, which closely approximated their true habitat. The most common habitat features included in the drawings of both groups were boreal forests with trees and shrubs. Additionally, representations of anthropogenically altered habitats were uncommon among both groups, but were slightly more common among the Naskapi Nation than the Dene Nation. Significant differences were apparent, however, when we considered how children represented the wolverine as a species. While most children from both eastern and western Canada chose not to include predator features such as teeth, blood, claws, or prey Dene children represented the wolverine as a predator (i.e. hunting) significantly more often than Naskapi children.

7.4.1 Drawings in the NWT

In general, drawings such as those we analyzed in this study reflect or symbolize daily life for their creators (Barraza, 1999). It is not surprising, therefore, that the children who participated in our study recreated things they know or see in everyday life, like trees in a boreal forest, or hills and rocks. What is telling, however, is that the children seemed to associate the wolverine with unaltered environments and often represented the wolverine in a tundra or mountain landscape despite not living in such habitats themselves. Interestingly, no children represented the wolverine in an anthropogenic setting despite many of the Dene we

interviewed commenting on wolverines coming closer to city now than before: "*they are slowly moving into the city. Before you had to go further out to trap them. Now you don't they come right into your backyard.[…] is because of the restaurants. All those smells go into the air and that attracts them* (Dene male, Elders, participant 10). Even with this behavioural shift, wolverine are still primarily found only out in the wilderness: "*They'll go to the forest or get up the hill like that*" (Dene male, Elders, participant 8); *"They are following the caribou. Because the caribous are going into the treelines*" (Dene male, Elders, participant 9). Wolverine rely on unaltered landscapes (Banci, 1994; Copeland, 1996; Heinemeyer et al., 2019; Scrafford, et al., 2018; Weaver, Paquet, & Ruggiero, 1996) and the children that participated in our study may recognize this fact and have chosen to represent it in their drawings.

Alternatively, the children may have chosen to depict wolverines in pristine environments due to their interpretation of the question: "*Please, draw a wolverine in its environment*", to mean an ideal, undisturbed, natural environment. Children may also simply prefer pristine environments as opposed to human impacted environment as was found by Kalvaitis & Monhardt, (2012) and by Stokas et al. (2016). It is also possible that the children who participated in this study may not have been aware that pollution or habitat alterations are significant threats to wolverines and wildlife in general, and their representations of wolverines far from inhabited areas represent naïve, positive representations of their own environment. The work of Eloranta and Yli-panula (2005) contradicts this idea, however, as they found that children represent animals in their own environments rather than idealized representations of those environments.

Palmer (1996) suggested that school curricula and everyday experiences both affect the representations of the environment in the drawings of children. In which case, if children are not learning about the threat posed by pollution and habitat alteration in school, this may explain why it was not more prevalent in their drawings. It is therefore difficult to know from these drawings alone if children in the NWT are indeed aware of the threat posed to northern species, including the wolverine, by the actions of humans and more research may be needed.

Regarding the physical appearance of wolverines, in most of the drawings we collected in the NWT, children drew wolverines that resembled other more common carnivores like a foxes or wolves, and two examples resembled a bird. This may indicate that the children who

participated in our study do not have a firm grasp of the morphology of wolverines. Instead, this result suggests that young people in the north have a general understanding of this species' ecological role, and likely assume they resemble other more common species with a similar role (i.e. carnivores of similar size). This may be the result of the wolverine being elusive and many of the children never having directly seen a wolverine. This idea is consistent with the sentiment of many Dene adults that we interviewed who commented on a decrease in the wolverine abundances or a need to go farther to see these animals: "*So there are less and less of the animals [wolverines] that we see now. Because when we go look for them, we have to go quite a far away sometimes.* (Dene male, Elders, participant 9). It also suggests that the children do not necessarily associate certain physical features with carnivores as the majority of children also did not portray teeth, blood or claws in their drawings. Even so, the majority of children described wolverines as a predator species when asked verbally.

Concerning the behaviour of wolverines, members of the communities we visited commonly referred to a specific behavioural characteristic which were noticeably absent from the drawings we collected, namely, that wolverines are gluttons and are always looking to steal food. In many of the interviews we held with community members, Elders recalled stories where wolverines would target traplines, stealing from traps or taking bait (or meat) from cabins and camps: *"Wolverines do that [steal], if you are not around. They will go in your chimney, they can even chew their way in. We don't use plywood to build houses because the wolverines can chew through that. Before we used to use ordinary glass in the windows but the wolverines would break it, so now we use plexiglass. It's thick plastic and they don't break that".* (Dene male, Elders, participant 8); "*They [wolverine] follow your trail all the time* (Dene male, Elders, participant 9). Half of the children from the NWT that participated in the study portrayed the wolverine hunting or looking for food, though none depicted the wolverine stealing food. This result suggests that while children are aware of such reputations, they may be sceptical or uncomfortable with them, choosing instead to portray activities which seem more likely. The most commonly depicted prey species was a rabbit, rather than the caribou which is the wolverine's primary food source in the NWT (Mulders 2001), also noted by Dene People: "*they will kill caribou too"* (Dene male, participant 10) and "*they need to follow the caribou*" (Dene male, participant 11), suggesting that knowledge about the wolverine's diet may be lacking.

7.4.2 Drawings by First Nation Children in Quebec and the NWT

Contrary to the works of Alland (1983) and Wales (1990) who found cultural differences in drawing elements among nationalities, we found no such differences among the habitat components of the drawings by Dene and Naskapi children. One possible explanation may be that the hypothesis of Kellogg, (1970) and Barraza (1999) may be correct and all children tend to draw such characteristics similarly regardless of their cultural backgrounds. In which case, though the type of exposure to wolverines may differ among these two groups, they both have a similar understanding of the types of environments wolverines require. Alternatively, the similarities among the drawings among these two groups may have been the result of the children choosing to represent the habitat around them and both groups inhabiting the same ecozone within Canada, the taiga shield, despite living nearly 3000 km apart. Both of these options are supported by the prevalence of trees and forests in the drawings, though the increased frequency of mountains among the drawings collected in the NWT may suggest an awareness by the children there that wolverine habitat ranges extent to include much of the Rocky Mountains and mountain ranges west of the Mackenzie River. This is difficult to say with certianty though with the information at hand.

While there were many similarities among the habitats portrayed by Dene and Naskapi children, differences were present with the activities depicted for wolverines. In the NWT, wolverines were described as actively hunting and were portrayed with predator features significantly more often. This is consistent with the stories of active hunting practices by wolverines gathered from interviews with members of the Dene community who stated that: "*The wolverine can go up on the tree, and he'll sit there and the caribou will go by, he'll pick one with no horns, and he'll jump on it; right on the back, one bite and he'll stay there for a long time [...] until the caribou falls down"*(Dene male, Elders participant 8); *"*They would eat [hunt] moose, and caribou. Whatever they think they can get*"* (Dene male, Elders participant 10). While in Quebec, children preferred to depict the wolverine as simply walking through the wilderness.

This difference may be the result of wolverines disappearing from Quebec over 40 years ago, along with some understanding of its ecological role. Interestingly, as with Dene children in the NWT, Naskapi children did not portray wolverines as searching for food in

homes or cabins despite hearing stories of wolverines being tricksters and thieves (Peastitute, 2013). This results was unexpected, given stories that we heard from Dene people who referred to the wolverine' behaviour: "*If you got caribous in your sled, they will go to your camp that night, and he will try to get some of that"* (Dene male, Elders, participant 8); *"if they are really hungry, they may do that [break in your cabin]*" (Dene, Elders, participant 9), even one of the children recalled a similar story that happened to them couple of years earlier: *"a wolverine broke in my grandpa's cabin and ate all my Easter chocolate"* (Dene boy, 9 years old).

Alternatively, for the Naskapi children the lack of depictions of wolverines hunting may be a consequence of the wolverine's reputation as a thief, and the association of wolverines with stolen food rather than hunting. This seems unlikely, however, due to the absence of drawings depicting food caches, cabins, or traplines. It is not very clear why Naskapi children decided to not represent wolverines hunting. Further studies into this issue will be required to reach a conclusion.

Even though wolverines have not been seen in the Schefferville area, the collective memory of this carnivore is still present. A book published by the Naskapi Nation in 2013 contains a compilation of stories about wolverines by Elder John Peastitute. Stories from this book are aired on the local radio in Kawawachikamach and represent an example of how knowledge of this species, along with memories and emotions associated with them, is still being pass from elders to the younger generations. This may explain why Naskapi children still know some general facts about wolverines despite never having seen one in their lifetimes (except maybe on television or in a zoo). Some of the Naskapi children that participated in our study had also heard stories of first hand encounters from friends and family: "*A long time ago, my ancestors would hide their food from the wolverine, but the wolverine would find the food and piss on it"* (Naskapi boy, 7 years old); and "*they keep food,… the wolverine steal all their food* (Naskapi girl, 10 years old). Similarly, Naskapi adults with whom we spoke also confirmed that they had learned about wolverines from the radio, books and from the stories from elders: "*Sometimes, they play stories about wolverines on the radio. The wolverine likes to trick other animals, like a goose. He is a trickster"* (Naskapi male, between 31-45 years old, participant 1);*"He was a thief! My father told me that*" (Naskapi man, between 46-59 years old, participant 6). Several of the people we spoke to admitted gaps in their knowledge about

wolverines however: *"I don't know much about wolverine. I heard stories about wolverine from my grand-father [...] he saw a lot of wolverine up north in Fort MacKenzie. He is dangerous and sneaky and fast, he stole a lot of food [around Fort McKenzie]"* (Naskapi, man, 50 years old, participant 4). In General, what we heard supported the idea that memories of wolverines are still present among the Naskapi, despite the absence of wolverines: *"I have never seen a wolverine, but I always heard about wolverines*". (Naskapi, Elders, participant 10), or "*I never saw one. Even the father never saw one. We only know the stories. All is left, are the legends and stories: He stole the food*." (Naskapi, female, between 31-45 years old, participant 13). The presence of such collective memories, despite the absence of their subject, has also been found in studies in other parts of the world (Skogen, Mauz and Krange, 2008; Lescureux *et al.*, 2011). These past works found that even after a species disappears from an area, or their numbers decrease such that encounters become rare, the memories, myths, local anecdotes and emotions associated with that a species may remain alive.

In the present case, the reputation of wolverines in Quebec, supported by statements from multiple community members, seems to be primarily that of a thief. While theft from traplines does occur elsewhere in the wolverine's home ranges in western Canada (Bonamy 2019), it does not seem to figure as strongly into their reputation as it does in regions where wolverines are no longer present. This seems to suggest that the collective memory of people in Quebec is primarily shaped by incidents where wolverines caused the loss of food and income. This is consistent with the observations of Kansky and Knight (2014, p.102) who noted that: "*stronger experiences are more likely to be retained in memory*". Indeed, the loss of food, particularly if times are hard, can certainly have a strong influence on one's outlook towards the cause of such hardships. *"He is a thief. He goes everywhere where he is not wanted. Always a thief."* (Naskapi, Elders, participant 14); or *"Wolverine used to steal food all the time*" (Naskapi, man, between 46-59 years old, participant 9), and "*The wolverine can break inside your house. He can eat everything inside, people starved. The wolverine, he eats and eats everything."*(Naskapi, woman, 50 years old, participant 12*).* Even if people are no longer experiencing a direct conflict with wolverines, the memories and strong negative emotions associated with this species are still present today:

> *He stole their livelihood, their food. The elders stored their food for Christmas. When they came to see it, everything was gone. And it was*

> *the wolverine […]. He took everything from the people. Even when they hide the food in a cache, he came to break in. People don't really like him. Every story I heard about wolverine, they [people] don't like him.* (Naskapi, man, between 46-51 years old, participant 5).

7.5 Conclusion

Drawings were used in this study as a method to assess the perception of wolverines and its environment by children in regions of Canada with and without wolverine. Where species, like the wolverine, have disappeared, basic knowledge and understanding about these species can persist among the younger generations through stories and the collective memories of the communities. It is likely, however, that over time, the strongest feelings towards such species increase in relative abundance or importance within the community and tend to be favoured for transmission from the older generations to children through stories. This results in a potential for misperceptions to develop over time. Fortunately this potential does not always manifest among the younger generations. Despite never having seen a wolverine in the wild and having only heard stories of the mischief that wolverines can cause, Naskapi children who participated in this study chose not to portray their wolverine causing damage or stealing food. Results such as these provide us with an understanding of how children feel about this emblematic yet threatened species and can help with the planning of environmental educational programs and conservation campaigns in the future. Based on the results in this study, few drawings (n = 3) represented threats to wolverine : one drawing from the Naskapi Nation represent one wolverine eating a poisonous fish, the two other drawing from the Dene Nation represented one wolverine being poisoned, and one wolverine hunting in a polluted environment, we would recommend complimenting any educational programs with information about the effects of socio-environmental changes (e.g., human activities such as global warming, infrastructure development, tourism, etc.) and the resulting threats this poses to wolverine and wolverine habitat. Teaching children how to minimize their environmental footprint and why this is important should be developed and linked to the wellbeing of local species like the wolverine.

Furthermore, the above results highlight the importance for educators and environmental managers to target their efforts on knowledge about wolverine learnt by

children in order to reorient any "negative" perceptions of this species. Also, it is important not to forget the role that adults play in the development of a child when developing such programs as they can be a significant source of information to a curious child. Future work on this subject should consider expanding the investigations to include larger cities such as Calgary, Edmonton or Vancouver that are surrounded by differing ecozones to see how this is reflected in the representation of wolverine's habitat. In conclusion, our study is in line with Figari and Skogen (2011, p.217) who argue that: *"the theory of social representations provides a comprehensive framework for studying the complex relationship between consensus and diverging opinions, and between culturally embedded representations […]".*

La bibliographie relative à cet article se trouve à la fin dans les références

Chapitre 8 Public opinion toward a misunderstood predator: What do people really know about wolverine and can educational programs promote wolverine conservation?

Bonamy M., Harbicht A.B, Herrmann, T.M., Christine Gagnon (2019). Public opinion toward a misunderstood predator: What do people really know about wolverine and can educational programs promote wolverine conservation? Ecoscience

Contributions des auteurs

Mise en place du protocole de l'étude (Morgane Bonamy)

Collecte des données (Morgane Bonamy, Andrew Harbicht)

Analyse des données (Morgane Bonamy, Andrew Harbicht)

Interprétation des résultats (Morgane Bonamy)

Rédaction du manuscrit (Morgane Bonamy)

Commentaires et correction du manuscrit (Morgane Bonamy, Andrew Harbicht, Thora Herrmann, Christine Gagnon)

Afin de répondre au sous objectif qui était d'évaluer le rôle de la conservation ex-situ (en présentant un carcajou dans un zoo) sur le degré de connaissance et la motivation des populations envers la conservation du carcajou; nous avons enquêté auprès du public du zoo de St Félicien (les visiteurs et les enfants participant à un camp nature de 5 jours sur les animaux).

8.0.1 Abstract

Among the least known of Canada's large predators, the wolverine's status as threatened, or endangered throughout its eastern range, makes it a candidate for conservation programs. A lack of public support, however, can dramatically reduce the chances of such programs being successful. To assess the current state of support for wolverine conservation, knowledge and perceptions toward this species among the public, we surveyed adults visiting the St. Félicien zoo. Knowledge among participants was generally low and misconceptions were abundant, even among repeat visitors to the zoo. Attitudes, however, were mostly positive. To assess how exposure can influence perceptions, children were surveyed who had or had not attending a 5-day camp at the zoo. Both groups demonstrated similar levels of knowledge about this species; however children who had attended the camp demonstrated a greater aesthetic appreciation and fewer negative associations with wolverines. These results suggest that while wolverines are not a well know species, people's perceptions toward this species are not necessarily negative. Additionally, information provided by zoos, in a variety of forms, may not always be acquired by visitors, but may still have a significant positive influence on how the public perceives cryptic misunderstood species such as the wolverine.

8.0.2 Résumé

Parmi les moins connus des grands prédateurs du Canada, le carcajou est menacé ou en voie de disparition dans l'ensemble de son aire de répartition, ce qui en fait un candidat idéal pour les programmes de conservation. Cependant, un manque de soutien de la part du public peut réduire considérablement les chances de succès de tels programmes. Afin d'évaluer l'état actuel du soutien à la conservation du carcajou, le degré de connaissances et les perceptions de cette espèce parmi le public, nous avons mené une enquête sur les adultes visitant le zoo de Saint-Félicien. Les connaissances des participants étaient généralement faibles et les idées fausses abondaient, même parmi les visiteurs assidus du zoo. Les attitudes, toutefois, étaient généralement positives.

Les enfants ont été interrogés avant ou après avoir participé à un camp de cinq jours au zoo, pour évaluer dans quelle mesure l'exposition au carcajou peut influencer les perceptions. Les groupes avant et après ont démontré des niveaux de connaissances similaires sur cette espèce.

Cependant, les enfants interrogés après le camp ont démontré une plus grande appréciation esthétique et moins d'associations négatives envers les carcajous.

Ces résultats suggèrent que, même si le carcajou n'est pas une espèce bien connue, la perception du carcajou n'est pas nécessairement négative. De plus, les informations fournies par les zoos, sous différentes formes, peuvent ne pas toujours être acquises par les visiteurs, mais peuvent néanmoins avoir une influence positive significative sur la manière dont le public perçoit les espèces cryptiques mal comprises telles que le carcajou.

8.1 Introduction

Managing and protecting wild populations depends not only on the practices used, but also on public support (Kellert et al. 1996; Ontario Wolverine Recovery Team 2013; Environment Canada 2016), particularly when dealing with predators (Bright et al. 2000; Bath and Enck 2003; Kretser et al., 2009; Campbell and Alvarado, 2011). Indeed, when restoration and conservation programs focus on predators whose natural habitat touches or overlaps populated areas, public opinion is one of the strongest predictors of a program's success (Decker et al. 2002). If public opinion toward a species is not favourable, it can be difficult, even impossible, to protect it (West and Brockington 2006; Ericsson et al. 2007; Milenković 2008). Generally, well liked predators are more likely to garner public support and benefit from successful conservation programs (Gunnthorsdottir 2001; De Pinho et al. 2014). For this reason it is sometimes necessary for conservation programs to focus, not only on the biological side of wildlife management, but also on public relations.

Currently, one of the most effective ways to increase public acceptance toward a particular species is through wildlife education programs (Patrick et al. 2007; Jacobson et al. 2015). Before launching such informational or educational programs, however, it is useful to determine the perceptions and the general level of knowledge about a species among the general public so that specific shortcomings or issues can be addressed. New wildlife management plans that are likely to benefit from public educational programs should therefore begin by assessing current public opinion toward the target species prior to implementing outreach programs or management actions (Kellert 1984b; Fulton et al. 1996). One predator which is currently under consideration for a governmental conservation program in eastern

Canada (Environment Canada 2016) and which will likely benefit from an accompanying public outreach program is the wolverine (*Gulo gulo*).

Wolverines were once present throughout most of Canada's boreal forests and tundra regions (Banci 1994), however their current numbers and distributions have shrunk to a fraction of their historical levels. While wolverines can still be found in western and northern Canada, the eastern populations have declined to the extent that the last confirmed wolverine sighting east of Ontario occurred near Schefferville, Quebec in 1978 (Fortin et al. 2005). Due to this population decline, the wolverine has been classified as endangered in Quebec and Newfoundland and Labrador, while it is listed as extirpated from the Maritime provinces (Gallant et al. 2016). In Manitoba and Ontario, wolverines have been listed as a *species of special concern* (COSEWIC 2014). These low densities are primarily the result of intense hunting and trapping (Fortin 2005) as well as population declines among other species on whom the wolverine depends, such as the wolves who produce the carcasses that wolverines eat (Van Dijk et al. 2008; Koskela et al. 2013).

The decline of wolverines from eastern Canada over the last 50 years has not resulted in their disappearance from the collective memory (Figari and Skogen, 2011). They are still present in many stories and legends (Gyles 1736; Seton 1953; Savard 1971; Benson 2014), playing a key role as a ferocious, extraordinarily strong, and mischievous animal (Savard 1971; Peastitute 2013). These deeply engrained, and often negative, perceptions of wolverines can hinder future conservation programs (Kellert et al. 1996; Bright et al. 2000). Programs such as the one proposed by the province of Ontario to re-establish self-sustaining populations throughout their historical ranges within the province (Ontario Wolverine Recovery Team 2013; Environment Canada 2016). If wolverines have any chance of re-establishing themselves in Quebec the general public in Quebec must be willing to live in close proximity with this often misunderstood species. Effort should therefore be made to promote the social acceptance of this species through environmental and conservation education well in advance of its arrival (Shepard and Speelman 1986; Dettmann-Easler and Pease 1999).

Important first steps in promoting a more positive public opinion toward wolverines will be to: a) assess the current level of public knowledge and perceptions toward this species in order to identify gaps or issues and; b) provide the public with accurate and accessible information about this species. For conservation programs to be successful, it is important to

have the support of both the general public, as they are the primary tax base who will fund such programs, and the local stakeholders who will be most directly affected by conservation measures. Environment Canada (2016), notes that support from Indigenous communities and northern hunters/trappers will be necessary for the success of future management plans. Certainly, Indigenous communities in Quebec's far north are the most likely candidates to experience possible negative consequences as a result of the wolverine's return. Rural inhabitants nearly always bear the brunt of human-wildlife conflicts relative to urban inhabitants (Oli et al. 1994; Williams et al. 2002; Ericsson et al. 2007), particularly with species that avoid human-altered landscapes, like the wolverine. Small, isolated indigenous communities are not the only groups likely to encounter this species however. Further south, more populated regions such as Saguenay-Lac-Saint-Jean contain a high proportion of hunters, whose excursions into the wilderness are likely to bring them into contact with such cryptic species. For this reason, we have chosen to assess public knowledge and perceptions toward wolverines at a prominent attraction within the Saguenay-Lac-Saint-Jean region, the St. Félicien zoo.

The number of programs, exhibits and information already present in zoos make them an ideal place to focus such efforts (Wolf and Tymitz 1980; Swanagan 2000). Over the years, modern zoos have become more than simply entertaining destinations for family outings (Ryder 1995), they are also well positioned to fulfill a role in environmental education and an integral part of ex-situ conservation programs (Ballantyne et al. 2007; Patrick 2007; Packer and Ballantyne 2010; Luebke et al. 2015). By conserving the genetic diversity of species at risk or by participating directly in breeding programs and species reintroductions (Kleiman 1989; Ryan and Saward 2004), zoos can be an invaluable component of conservation programs for rare and endangered species. The popularity of zoos among families with young children also lends to their being a convenient method for parents to inform children about issues related to conservation (Wolf and Tymitz 1980). At the same time, the zoo’s kid friendly atmosphere makes them an enjoyable way for teachers to reinforce classroom lessons on biodiversity and conservation. Children also represent a group of special interest to public outreach programs as they represent the next generation who will take over responsibility of future environmental and wildlife conservation programs.

Studies have shown, among the general public that the average level of interest for biological conservation increases after visiting a zoo (Derwin and Piper 1988; Swanagan 2000), however Balmford (2007) argues than a single visit to a zoo may not have an effect on knowledge. Nevertheless, seeing animals up-close, particularly elusive species such as the wolverine, while receiving accurate information about that animal's biology and ecological role makes zoos an ideal place for informing the public while positively influencing public opinion (Reade 1996, Falk 2007, Clayton 2009).

Our goals in this study were to a) assess the current state of public knowledge and perceptions toward wolverines among visitors to a zoo, both young and old; b) evaluate the expression of values toward wolverines among adults; and c) determine if the knowledge or values expressed toward wolverines by children is altered in any way by participating in a summer camp at the zoo. To achieve these goals, we addressed the following hypotheses among adult participants 1) repeat visitors to the zoo will demonstrate higher levels of knowledge about wolverines than first time visitors, 2) relative to visitors from smaller, more isolated areas, visitors from more urban settings will express more positive values toward wolverines due to the reduced likelihood of their having experienced (negative) encounters with wolverines or other wild predators, and 3) men will display higher levels of knowledge about wolverines than women as knowledge of cryptic species tends to be positively associated with outdoor activities such as hunting, a more popular activity among men than women (Tikka et al. 2000). Our hypotheses regarding children attending the summer camp at the zoo were more heavily focused on the effectiveness of zoo outreach programs. Namely we expect that 1) children surveyed after attending a summer camp at the zoo will exhibit higher levels of knowledge and/or express more positive values toward wolverines than children who have not attended such a camp, and 2) children with a pet at home will exhibit a higher level of knowledge and more positive values toward wolverines than children without a pet at home due to a correlation between having a pet at home and the expression of interest among children for animals in general (Paul and Serpell 1993; Bjerke et al. 2003).

The results from this research will have direct implications for the planning of future wolverine conservation efforts, both within Quebec and in other areas where human intervention may be required to establish or maintain self-sustaining wolverine populations

into the future. To our knowledge, this study is the first to assess public opinions and knowledge of wolverines among the general public.

8.2 Methods

8.2.1 Study area and data collection

The St Félicien zoo is one of Quebec's largest zoological gardens, located in the Saguenay-Lac-Saint-Jean touristic region of Quebec (Figure 8.1). It is currently the only zoological garden in Canada to have captive wolverines: one female and one male. This, together with the zoo's location within a popular touristic region of Quebec makes it an ideal location to conduct a study on public opinion toward wolverines. The St. Félicien Zoo draws visitors from a wide area including large urban centers to the south and more isolated communities to the north. Additionally, the zoo also runs an annual youth outreach program, a multi-day summer camp in which children learn about the animals within the zoo.

This zoo receives over 150 000 visitors per year, mostly from the surrounding region. It consists of two sections: a pedestrian area, with exhibits featuring elevated boardwalks over enclosures, transparent viewing windows, and a petting zoo; and a second section which is in the style of a safari, where animals are free move around at will, and visitors are treated to an educational guided tour from the comfort of a small rubber-tired train. The zoo's primary focus is on northern and boreal animals, with species from multiple continents ranging the entire globe. Presently, the zoo's wolverine exhibit is located in the pedestrian section of the zoo, near the entrance. Visitors can walk on an elevated board walk above the enclosures and observe these animals in habitat similar to their natural habitat in a boreal forest. A sign with biological and ecological information about wolverines is available for visitors to read in front of the enclosure and, once each day, visitors can partake in an interactive demonstration during which a zoo employee feeds the animals while providing additional information over a loudspeaker.

Figure 8.1: Location of the St. Félicien Zoo in the province of Quebec (cartography: Marc Girard, Université de Montréal, 2016).

Two types of surveys were administered to visitors to the zoo: an adult and a youth survey. Prior to issuing any surveys, an ethics certificate was acquired from the Ethics Committee for Arts and Science Research at the University of Montréal, Canada (CERFAS-2013-14-201-D), and consent was acquired from the manager of the St Félicien Zoo. In each

case, before commencing with the survey, the project was explained to participants and verbal or written consent was acquired.

The adult's survey (annexe 6) was designed such that participants answered the knowledge questions before visiting the zoo in order to test their level of knowledge about wolverine prior to reading the informational panels near the wolverine exhibit. The same visitors were then asked to complete the sections regarding conservation and the expression of values toward wolverines after visiting the zoo. Splitting the survey in this way (5 minutes before and 5 minutes after visiting the zoo) minimized the contiguous time required for participants to complete the whole survey, thereby increasing the likelihood of participation. The effect of visiting the zoo on the visitor's perception of wolverine was therefore not directly addressed among adult participants.

The children's survey (annexe 5) differed from the adult's survey in that it was designed specifically with children in mind. This survey was given to multiple groups of children who either had just completed the summer camp or who had not yet attended this camp. Both of these groups represented random samples from the larger population of local children interested in animals. As both groups were similar in terms of their age distributions, sex, or the frequency of pet ownership, any differences detected among the groups with regard to how they view wolverines will represent the indirect effect of the zoos summer camp at the population level.

8.2.2 Adult survey

Surveys were conducted inside the zoo between May 15th and June 25th 2016 and were only administered to visitors that met the following selection criteria. First, participants must have been residents of Quebec (for at least 10 years) when the survey was completed; second, participants must not have been current or recent employees or volunteers at the zoo; third participants must have been over 18 years of age, and participants must have had at least some knowledge of wolverines prior to visiting the zoo (i.e. they should at least know that the wolverine is a native species within Canada). The first half of each survey completed by visitors before entering the zoo collected demographic information and assessed their level of knowledge about wolverine biology and ecology. The demographic information recorded for

each participant included their sex (Male, Female), age-range (18-30, 31-45, 46-59, and 60+), previous exposure to the St. Félicien zoo (Yes, No), and the approximate size of their place of origin: large city (>250 000 inhabitants), average sized city (250 000 to 100 000), town (100 000 to 20 000), small village (20 000 to 5000), or community (<5000 inhabitants). Place of origin was categorized according to similar numbers of inhabitants as a multi-level proxy for rural vs urban lifestyles. These demographic data were used to identify potential groups with similar levels of knowledge about wolverines. After visiting the zoo, participants were asked to complete the second half of the survey, focussing on their opinions and values toward wolverines. Specifically, it contained questions designed to identify the expression of values defined below (see supplementary material). For surveys to be valid, both sections of the survey must have been completed.

8.2.3 Children survey

Surveys were administered to children participating in the zoo's 5-day summer camps between June 26th and August 13th 2016. During these camps, children remained inside the zoo, eating and sleeping in the facility. The camp's primary goal was to teach children about the species found within the zoo, with a focus on their behaviour and biology, including the roles each species play within their native habitat. Information was presented in the form of interactive question and answer periods while children observed zoo staff going about their usual routines. Children also got to observe "behind the scenes" work such as the preparation of food for the animals. Surveys were incorporated into the camp's program and administered by camp counsellors under the guidance of the primary authors. Children completed the surveys individually, but with adult supervision, either on the first or last day of camp.

As with the adult survey, children's survey began with the collection of demographic information including their age (8-13), sex (Male, Female) and whether they had a domestic animal at home (Yes, No). The next section of the survey addressed wolverines specifically and asked general questions about their biology, physiology, and ecology. The final section assessed the values and opinions expressed toward wolverines: this consisted of simple yes-or-no questions designed to assess the values children associate with wolverines along with a space for explaining their answers. (annexe 5).

8.2.4 Value Classifications

Diverse typologies exist in the literature for classifying values related to species (Kellert 1984b; Fulton et al. 1996; Dayer et al. 2007; Herrmann et al. 2013). To identify values and attitudes toward wolverines in the present study, and to assess how both children and adults feel about wolverine conservation, we adapted the value typologies proposed by Kellert (1984b). Kellert's study used nine different values (Aesthetic, Dominionistic, Ecologistic, Humanistic, Moralistic, Naturalistic, Negativistic, Scientific and Utilitarian) to assess perceptions toward wildlife. These original values were condensed in the present study to the following: *Aesthetic, Dominionistic, Naturalistic, Negativistic, Right to exist* and *Usefulness* (utilitarian) values along with an additional value which combined Kellert's *Ecologistic* and *Scientific* values into a single *Ecological/Scientific* value. Following work by Herrmann et al. (2013), we also added a *Cultural/Spiritual* value to our value typology, as the zoo typically receives both Indigenous visitors and summer camp participants. In addition to the above mentioned values, we added a new value, "*Environmental Protection and Awareness*", as we expected visitors to the zoo to have some pre-existing knowledge of issues related to endangered species and conservation given their interest in visiting the zoo, particularly repeat visitors (Table 8.1).

In the children's survey, the *Right to Exist* value was removed as it was not expected to produce informative responses since all children participating in a summer camp at a zoo were expected to express this value. In lieu of the *Right to Exist* value, a *Usefulness* value was added to determine whether children that likely have little exposure to the fur trading industry still assigned a *Usefulness* value to wolverines, a species historically trapped for its fur (see supplementary material).

Table 8.1: Value classification scheme used to assess the values and opinions of visitors (adults or children) to the St. Félicien Zoo, adapted from Kellert (1984b) and Herrmann (2013).

VALUES	DEFINITIONS	SURVEY
Aesthetic	Find this animal visually appealing	both
Cultural/spiritual	Acknowledge the importance of the wolverine in stories, legends, art, etc.	both
Dominionistic	Believe that animals serve a purpose for humans, like sport hunting, believe that humans have control over the animals	adult
Ecologist/scientific	Appreciate the role of wolverines in terms of biodiversity, appreciate all kinds of animal, acknowledge the importance of wildlife and relationships between animals	both
Environmental protection and awareness (EPA)	Believe that animals and their habitats should be protected. motivation to protect the environment and wildlife	both
Naturalist	Affection for wildlife and nature, interested in seeing a wolverine in the wild, treat wolverines with respect, pro-conservation and protection of this species	both
Negative	Avoidance of animals due to dislike or fear, fear wolverines, find wolverines to be very dangerous.	both
Right to exist	Believe that all wolverines have the right to live on earth	both
Usefulness	Find a practical use for wolverines, i.e. fur	child

8.2.5 Statistical analyses

From each survey, knowledge scores were calculated by summing the total number of correct and incorrect responses by each participant (9 points in total for the adult survey and 19 points for the children's survey). A logistic regression (binomial or quasibinomial generalized linear model: GLM) was then used to determine whether the scores obtained on the knowledge section ($n_{correct}$ / $n_{incorrect}$) partitioned differently among the various demographic groups. This was done by fitting a global model containing all demographic variables and conducting backwards model simplification based on deviance levels among

models using Chi-square tests (or F-tests in the event that overdispersion was detected and a quasibinomial distribution was used). A cut-off p-value of 0.05 was used to distinguish whether deviance measurements among models differed significantly. This process was repeated until further model simplification significantly worsened the model's fit or a model containing only an intercept (the null model) was reached. Once a minimally adequate model was reached, further simplification was attempted by collapsing levels of each categorical variable present. As with variable removals, appropriate deviance tests (Chi-square or F-tests) with critical p-value of 0.05 were used to determine whether variable simplification was justified. Following this, residuals were inspected to insure model assumptions were met and multicollinearity among explanatory variables was assessed. The expression of values by participants (expressed / not expressed) was modelled in an identical manner. Separate GLMs were constructed for each value, beginning with the global model followed by backwards model simplification as described above. Results were analyzed in an identical manner for the adult and children surveys with the inclusion of the additional variable survey session (Before/After) for the children's surveys.

With the adult survey, a word cloud was constructed based on keywords associated with wolverines chosen by the participants. Keywords were grouped into three categories: negative (e.g. bad, destructive, fierce), positive (e.g. smart, beautiful), and neutral (e.g. animal, forest). The frequencies of words in each category were used to corroborate the quantitative expression of personal values, thereby addressing the true underlying expression of values from multiple approaches (e.g. a triangulation of data, McNaught and Lam 2010). During the survey, we asked participants, individually, for explanations of the keywords they chose to ensure their proper interpretation and classification. This was done by a native French speaker (as all the surveys were in French) and reviewed by a native English speaker. When an appropriate translation was unclear, the data was omitted.

8.3 Results

8.3.1 Adults survey

In total, 230 adult surveys were initiated by visitors to the zoo during our study period, 170 of which were completed and used for subsequent analysis. The overall rate of

participation in the adult survey was low (5.6%) relative to the number of visitors to the zoo over the same period, however, the sex ratio of participants was fairly even, with the majority of participants being female (54%). The four age ranges used to describe participants (18 - 30, 31 - 45, 46 - 59, and 60+) were also fairly well balanced, with the majority of participants falling in the youngest age class (35.9%), and each of the other three age classes representing approximately a fifth of the remaining participants (23.5, 21.5, and 19.4 % respectively). Overall, most participants resided in small villages (30.6%), followed by communities and towns at 21.2 and 20.6% respectively. Residents of large cities represented only 15.9% of the participants, while the remaining 11.8% resided in average sized cities. The majority of visitors to the zoo described themselves as being from the nearby area.

The average knowledge score obtained by adults in the study was lower than we expected (36.35 ± 17.26%, mean ± sd) given the high proportion of repeat visitors to the zoo. Only 16 % of participants correctly identified the wolverine as being a member of the Mustelidae taxonomic family or were able to identify another species from the same family (e.g. American marten). Despite this, 47% were able to recognize a photo of a wolverine. When questions focused on the diet of this species, only a quarter (25%) of participants correctly identified that wolverines eat meat, and only 18% recognized that wolverines feed primarily on carrion. Regarding the wolverine's physical status, 33% of participants identified the correct weight category of wolverines from among several options while the remainder (67%) overestimated wolverine's weight. None of the participants underestimated the wolverine's weight however. Additionally, many participants believed the wolverine is dangerous ("[wolverines] *symbolize ferocity; it is a mean animal; he is dangerous for people; small animal; fierce; very dangerous*": quotes from outcomes of adult surveys issued before visiting the zoo, (translated from French by the author).

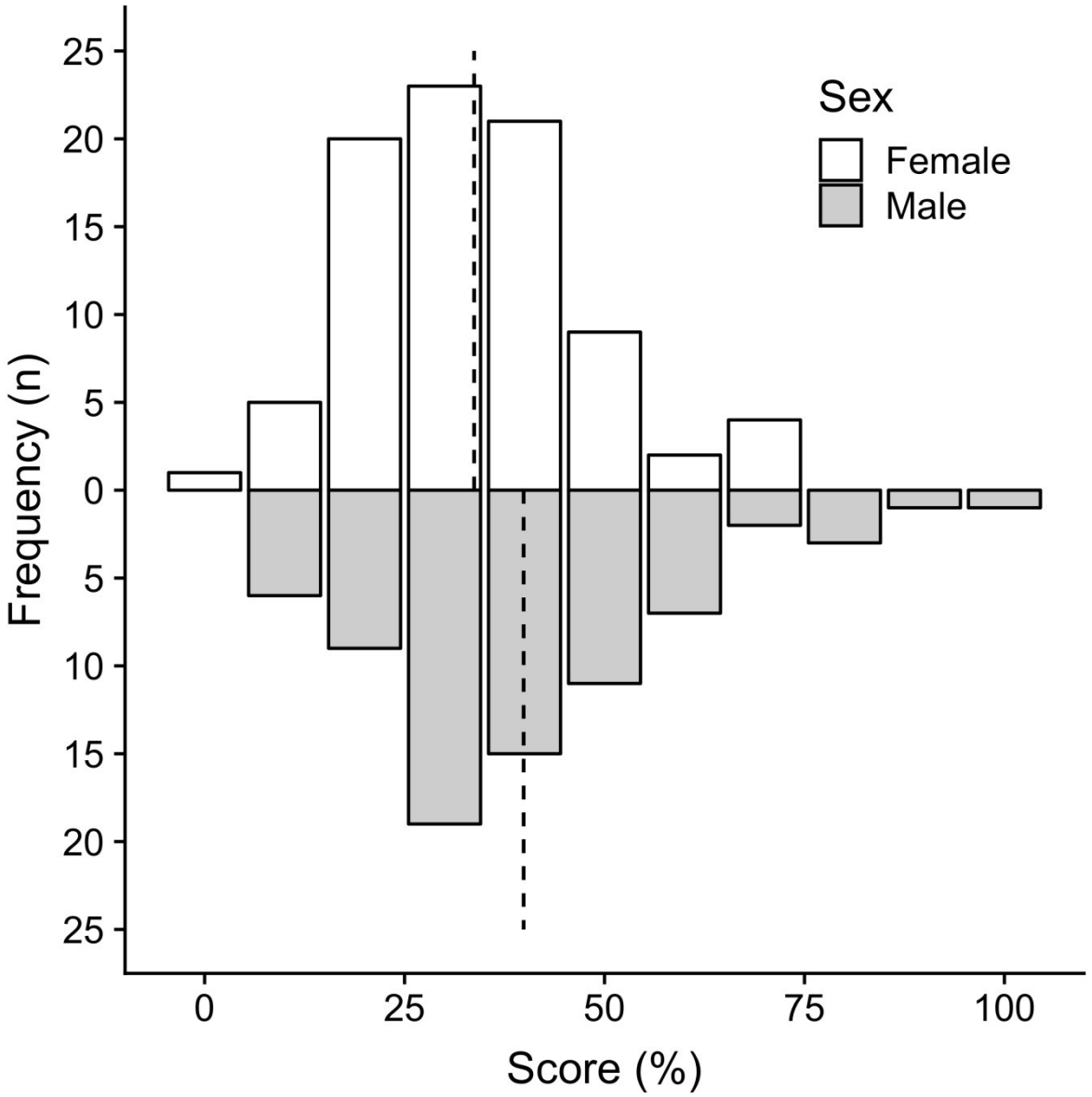
When the adult knowledge scores were modelled using a quasi-binomial GLM with demographic data as explanatory variables, the minimal adequate model was one containing only the sex variable (Table 8.2). This model explained significantly more variation than a simple intercept model ($df = 1$, $F = 4.78$, $p < 0.05$) while explaining the variation in the data as well as the next best model containing both the sex and past exposure variables ($df = 1$, $F = 1.25$, p-value = 0.27).

Table 8.2: Parameter estimates, standard errors, t-values and p-values for the minimally adequate quasibinomial generalized linear model describing the distribution of knowledge scores by adult participants in a wolverine survey as a function of demographic variables.

Parameter	Coefficient	Std. Error	t-value	p-value
Intercept	-0.675	0.082	-8.276	0.000
Sex (Male)	0.264	0.117	2.263	0.025

Dispersion parameter for quasibinomial family = 1.23

In this minimally adequate model of knowledge scores, men scored significantly higher, with average scores that were 6.3% above those of women participants (Figure 8.2). While there was a trend for higher scores among older age categories (data not shown), this trend was not significant. Similarly, there was no indication that place of origin had a significant effect on a participant's knowledge of wolverines. Interestingly, though their average scores were slightly higher, repeat visitors to the zoo did not score significantly higher on the knowledge section than participants visiting the zoo for the first time.



Surveys were administered to visitors to the St. Félicien Zoo between May 15th and June 25th, 2016. Dotted lines represent the average scores for men (39.9 ± 19.4, mean ± sd) and women (33.7 ± 14.5, mean ± sd).

Figure 8.2: The distribution of scores received by adult participants in a survey designed to assess knowledge of wolverine biology and ecology.

When asked about which values visitors to the zoo expressed in relation to wolverines (Figure 8.3), all participants identified with the belief that wolverines possess the *Right to Exist*. This perceived inherent importance of the wolverine was also apparent in several other values. For instance, nearly all participants identified that the wolverine possesses

Ecological/Scientific value (98.6%), a sentiment that was reinforced by statements from participants about the wolverine's role *"[wolverines are] part of the Northern Quebec ecosystem; [it] has a role as a carcass cleaner; [a] scavenger, he helps the biodiversity; each species has a role to play; equilibrium in nature and the food chain"*: quotes issued from adults surveys in relation to the *Ecological/Scientific* value expressed toward wolverines (translated from French by the author). Additionally, more than three quarters of the visitors acknowledged the wolverine's *Cultural/Spiritual* value (87.4%); *"He is sometimes used like a totem or like a characteristic about people; a legend for Montagnais people; important in the First Nation culture"*: quotes issued from adults surveys in relation to the *Cultural/Spiritual* value toward wolverines (translated from French by the author). At the same time, participants tended not to express the *Dominionistic* value (3.3%), choosing instead to associate more with a respect for the environment and its protection through the expression of the *Environmental Protection and Awareness* value (97.4%); "*animals are threatened with extinction; we need to protect them; animals need protection; each species is important to protect"*: quotes issued from adults surveys in relation to the *Environmental Protection and Awareness* values (translated from French by the author).

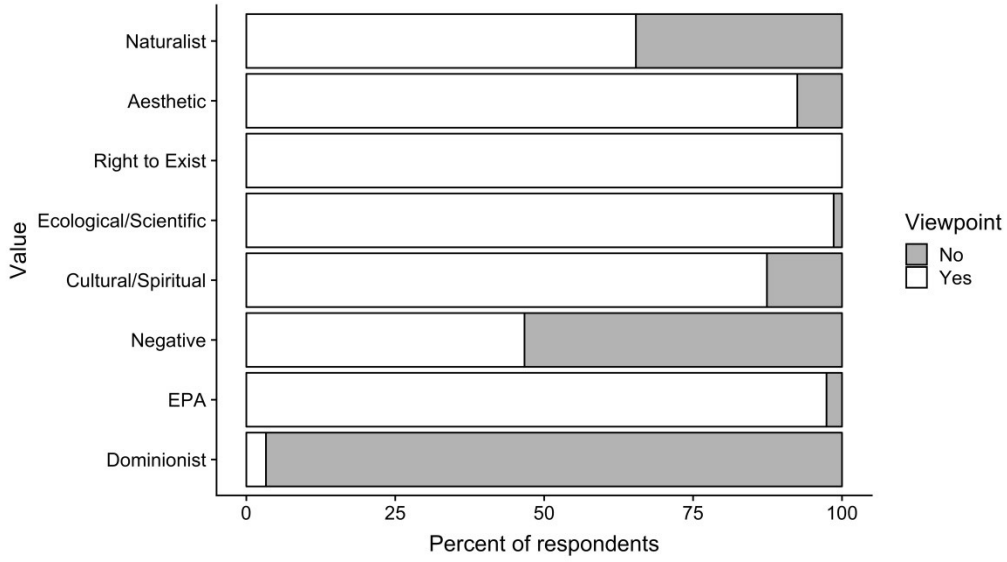


Figure 8.3: The expression of values as percentages of adult visitors to the St. Félicien Zoo between May 15th and June 25th, 2016, who participated in a survey about the perceptions and knowledge of the public towards wolverines.

As a result of the strongly polarized expression of many of the values assessed in our survey, only four values provided sufficient variation to permit modelling: the *Naturalist*, *Negative*, *Aesthetic*, and *Cultural/Spiritual* values.

For the *Naturalist* value, model simplification identified a minimally adequate model containing both the place of origin and age variables. Further variable simplification resulted in a model that only differentiated between two sizes for the place of origin variable ([large city and average city] vs. [town and village and community]). Additionally, the age class 31 - 45 years old was found to differ from all other age classes (Table 3). This simplified minimally adequate model significantly outperformed the null intercept model (df = 2, F = 4.14, p-value = 0.018) and predicted that participants between the ages of 31 to 45 had a 43% probability of expressing the *Naturalist* value in smaller communities, but a 63% probability in larger cities. Conversely, participants under 31 or over 45 years of age only had a 25% probability of expressing the *Naturalist* value when they originated in smaller communities and a 43 % probability when they originated in larger cities.

For the *Negative* value, model simplification of a quasi-binomial GLM supported a model containing only the past exposure variable (Table 3). This model was a significant improvement over a null model (df = 1, F = 4.75, p-value = 0.03) and indicated that participants who had previously visited the zoo had a 52% probability of expressing the *Negative* value relative to first-time visitors who had only a 30% probability of expressing the *Negative* value.

With the *Aesthetics* value, the minimally adequate model was a binomial GLM containing the age variable (Table 3). In this case, this model was further simplified by reducing the number of age categories to two groups, the first containing participants between 18 and 45 years of age and a second for all those over 45 years of age. The resulting model statistically outperformed a null model (df = 1, deviance = -6.19, p-value = 0.01) and predicted that younger visitors to the zoo had a 97% probability of expressing the *Aesthetic* value toward wolverines while older participants only had an 86% probability of expressing the same value.

Table 8.3: Parameter estimates, standard errors, t-values, and p-values for the minimally adequate quasibinomial generalized linear models of value expression as a function of demographic variables among adult visitors to the St. Félicien zoo.

Parameter	Estimate	Std. Error	t value	p-value
Naturalist Value[§]				
Intercept	-1.080	0.243	-4.447	0.000
Age[†] (31 – 45)	0.814	0.397	2.050	0.042
Place of Origin[‡] (City+)	0.793	0.383	2.071	0.040
Negative Value[§]				
Intercept	0.077	0.198	0.389	0.698
Past Exposure (No)	-0.910	0.430	-2.117	0.036
Aesthetic Value				
Intercept	3.423	0.587	5.835	0.000
Age[††] (>45)	-1.577	0.688	-2.294	0.022

[§] Dispersion parameter for the quasibinomial family = 1.02

† Age category levels reduced to only 31-45 vs. (18 – 31 & 45+)

‡ Place of Origin category levels reduced to average/large city vs. town/village/community

[††] Age category levels have been reduced to only 18 – 45 and 46 – 60+

With the *Cultural/Spiritual* value, model simplification failed to identify a model that outperformed the null model (df = 3, deviance = 2.92, p-value = 0.40). In other words, each visitor to the zoo had an 87% probability of expressing the *Cultural/Spiritual* value regardless of their sex, age, place of origin, or whether they had previously visited the zoo.

This variation was supported when participants were asked to identify three keywords that came to mind when they thought about wolverines. When keywords were classified as positive, negative, or neutral, half of participants (50%) had chosen at least one negative word when describing the wolverine (i.e. fear, violent…). Among the negative words, the most common words were: fierce (33 %), dangerous (27 %), and aggressive (27%, Figure 8.4*)*.

Despite many participants supporting, to some extent, the negative reputation of this species through the expression of the *Negative* value, nearly a quarter of participants (23,2%) assigned wolverines with a rank of biological importance equal to that of other northern

keystone species such as bears, wolves, and lynx. Furthermore, roughly half of the participants (46.5%) stated that they would be willing to pay some amount of money for future wolverine conservation and most (86.5 %) believed that all species, including the wolverine, should be protected. To this end, nearly three quarters of the survey participants (71%) thought it is important for the public be able to see a wolverine in a setting such as a zoo, while nearly half (46.5%) admitted that seeing a real wolverine in a zoo increased their willingness to protect this species.

Word sizes represent their frequencies among the responses.

Figure 8.4: A word cloud of the terms most commonly employed by adult visitors at the St. Félicien Zoo between May 15th and June 25th, 2016.

8.3.2 Children survey

A total of 118 surveys were completed by camp participants (70 from groups that had not yet participated in a camp and 48 from groups that had completed the camp). The overall sex ratio among the children that participated in our survey was in favour of girls and was similar among the before and after groups, 64% and 67% respectively. Similarly, the distribution of ages among the two groups was similar, with the both groups containing a majority of 10- to 12-year-olds. Specifically, the most abundant age group among the before-camp participants were 12-year-olds (27%) while among the after-camp participants 11-year-olds were more common (30%). In both groups, 8-year-olds and 13 year-olds were the minority (10.5% and 8.5 % among before-camp participants and 8.5 % and 3% among after-camp participants respectively). Both groups displayed similar proportions of children with pets at home (79.7% and 78.7% among the before- and after-camp participants respectively). These pets ranged from the common: dog and cat, to less-common varieties such as rabbits, lizards, and snakes.

Variations among the children's scores on the knowledge section of the survey were best explained by a minimally adequate model containing only the pet and age variables (Table 8.4).

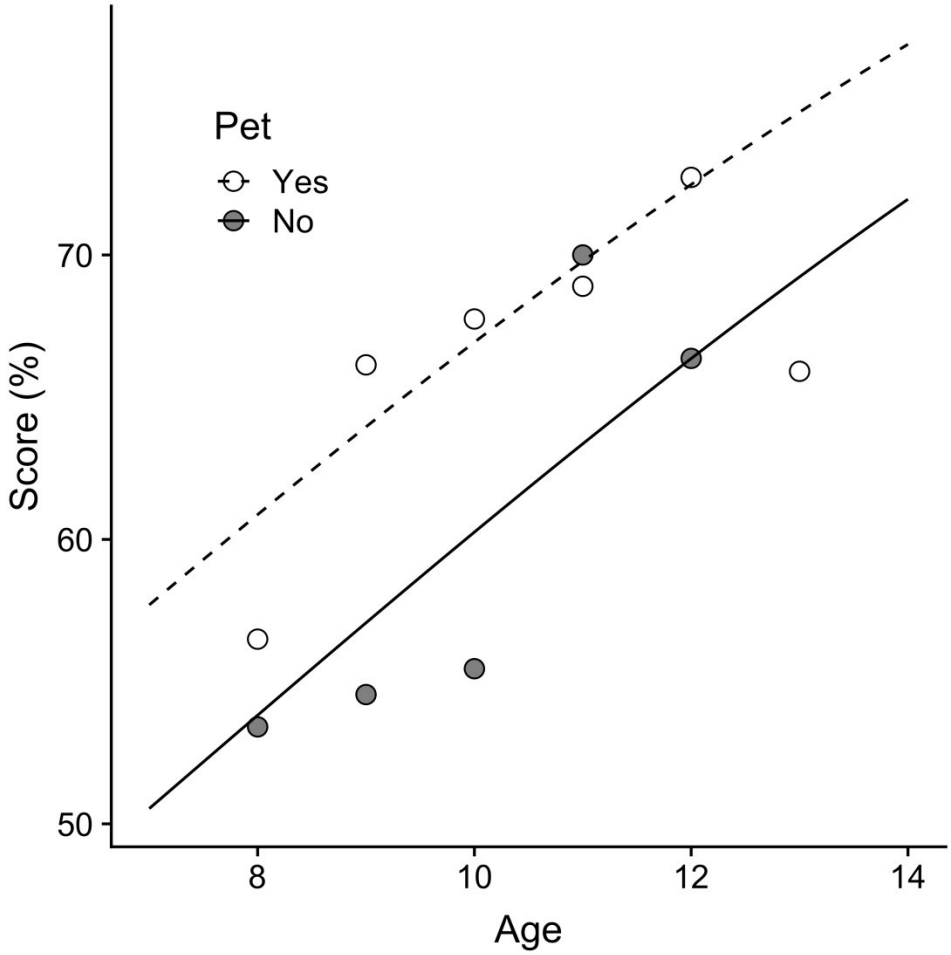
Table 8.4: The model coefficients, standard errors, t-values, and p-values of variables included in minimally adequate quasibinomial generalized linear model of the knowledge scores received by children on a wolverine survey.

Parameter	Estimate	Std. Error	t value	p-value
Intercept	-0.900	0.391	-2.300	0.023
Age	0.132	0.037	3.542	0.001
Pet (Yes)	0.289	0.120	2.400	0.018

Dispersion parameter for quasibinomial family = 1.30

This model was significantly better than a null intercept model ($df = 2$, $F = 9.54$, p-value < 0.01) and significantly outperformed the next best model including the camp exposure

variable along with the pet and age variables (df = 1, F = 4.02, p-value = 0.04). Within the minimally adequate model, children with pets at home scored, on average, 6% higher than those without, while older children outperformed younger ones, showing improvements of ~3% with each additional year of age (Figure 8.5).

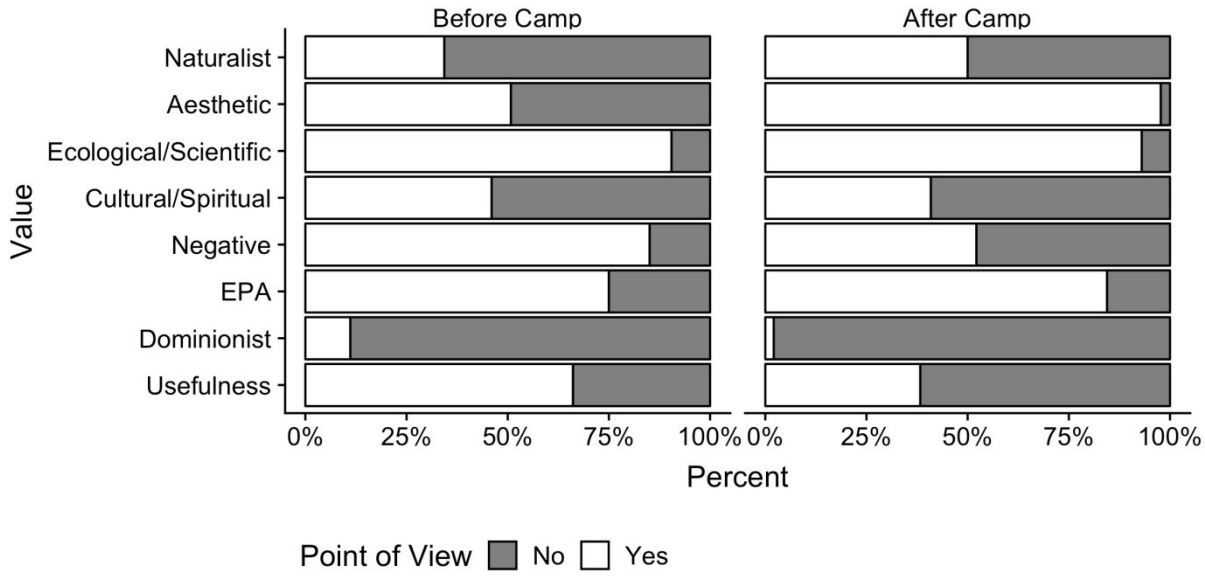


Lines represent fitted values from a logistic quasibinomial generalized linear regression.

Figure 8.5: The scores received by children during a summer camp at the St. Félicien Zoo (June 26th and August 13th 2016) when asked to answer questions about general wolverine biology.

When children were asked questions intended to identify which values they expressed in relation to the wolverine, the results differed from those of the adults we surveyed in that the children were less polarized (Figure 8.6). Noticeable similarities among the children's and

adult's responses were the lack of expression of the *Dominionistic* value and the high level of expression of the *Ecological/Scientific* value.



Surveys were completed either before or after attending a 5-day summer camp at the zoo.

Figure 8.6: Expression of values towards wolverines by children who participated in a summer camp at the St. Félicien Zoo (June 26th and August 13th 2016).

When the values expressed by children were modelled as a function of demographics, the *Naturalist* value was not found to show any correlation with any of the demographic variables. Rather, a simple intercept model was best, wherein children had a 42% probability of expressing the *Naturalist* value. As with the adult surveys, there was insufficient variation in expression of the *Ecological/Scientific* value or the *Dominionistic* value to effectively fit a model with the demographic data. For the *Negative* value, a minimally adequate model containing only the effect of the summer camp was found to significantly outperform all other models, including the null intercept model ($df = 1$, deviance = 12.08, p-value < 0.01). This model predicted that children that had not participated in a summer camp yet had an 83% probability of expressing the *Negative* value, but children that had participated in a camp only had a 52% probability of expressing this value.

Table 8.5: The model coefficients, standard errors, t-values, and p-values for variables included in minimally adequate binomial/quasibinomial generalized linear models with a logit link function.

Parameter	Estimate	Std. Error	t value	p-value
Negative Value[§]				
Intercept	1.629	0.349	4.666	0.000
Camp Session (After)	-1.538	0.464	-3.319	0.001
Aesthetic Value				
Intercept	0.470	0.301	1.564	0.118
Camp Session (After)	4.192	1.163	3.604	3.14E-04
Pet (No)	-2.176	0.824	-2.639	0.008
Environmental Protection and Awareness value				
Intercept	-4.862	2.182	-2.228	0.026
Age	0.583	0.216	2.697	0.007
Sex (Boys)	1.187	0.625	1.899	0.058
Usefulness[§]				
Intercept	0.667	0.285	2.338	0.021
Camp Session (After)	-1.201	0.420	-2.858	0.005

[§] Dispersion parameter for quasibinomial family = 1.02

The expression of values towards wolverines by children attending a summer camp at the St. Félicien Zoo, Quebec was modelled as a function of demographic variables.

With the *Aesthetic* value, the minimally adequate model was one which included both the summer camp and the household pet variables. This model significantly outperformed the null model (df = 2, deviance = 38.8, p-value < 0.01) and found that children with pets have a 62% probability of expressing the *Aesthetic* value if they have not participated in a summer camp, which increased to 99% following participation in a summer camp. The largest change, however, was among children without pets at home, who had a 15% probability of expressing the *Aesthetic* value if they had not participated in a camp, but a 92% probability of expressing this value if they had participated in a summer camp.

With the *Environmental Protection and Awareness* value, the data were best described by a minimally adequate model containing the age and sex demographic variables (Table 5). This model significantly outperformed the null model (df = 2, deviance = 11.40, p-value = 0.003) and predicted that younger boys, aged 8, have a 73% probability of expressing the environmental protection and awareness value, while girls of the same age only have a 45% probability. This disparity between the two sexes diminished with age such that 13-year-old boys had a 98% probability while 13-year-old girls had a 93% probability of expressing the *Environmental Protection and Awareness* value.

As with the adult surveys above, there was no significant relationship between any of the demographic variables we measured and expression of the *Cultural/Spiritual* value. The best model in this case was a simple intercept model which predicted that children attending a summer camp at the zoo had a 43% probability of expressing the *Cultural/Spiritual* value regardless of age, sex, whether they had a pet at home, or when they completed the survey.

For the *Usefulness* value, the best minimally adequate model was one containing the summer camp variable, which significantly outperformed the null model (df = 1, F = 8.70, p-value = 0.004, Table 5). In this model, children who had participated in a summer camp had a 66% probability of expressing the *Usefulness* value while children had not participated in the summer camp had only a 37% probability of expressing this value.

8.4 Discussion

Through an informal surveying program of visitors to the St. Félicien zoo over the summer period of 2016 and during a youth summer camp in that same year, we attempted to assess both the level of knowledge and the values that the general public, adults and children, express toward a species of conservation concern – the wolverine. This species has historically been cloaked in myths and legends that, more often than not, highlight their negative attributes, both physical and behavioural (Seton 1953; Banci 1994; Benson 2014; Woodford 2014). Our results indicate that while the level of knowledge by the general public about wolverines may be low, this is not necessarily associated with a poor opinion of this species. In general, support for environmental protection programs among the adults and children we surveyed was high, possibly due to the increasing role that environmental awareness plays in

today's society (Fulton et al. 1996; Dunlap 2002; Manfredo et al. 2003). Furthermore, exposure to this species through avenues such as informative activities related to wolverine and educational programs at zoological gardens appear to be an effective means of improving public opinion among the younger generations.

8.4.1 Adults survey

The adult survey program confirmed that for many residents of Quebec, where wolverines have been extirpated since the 1970s, the wolverine is a little-known species that evokes fear and caution. When asked, visitors to the St. Félicien zoo described the wolverine using words that carry strong negative connotations such as fierce, aggressive, bad, and dangerous. This reputation of wolverines as being dangerous and fierce animals has been mentioned in the literature (Seton 1953; Banci 1994) and possibly stems from the multitude of stories of wolverines breaking into houses or cabins, stealing food and damaging property (Hash 1987; Banci 1994; Benson 2014). Such stories can only add to the wolverine's reputation, and may contribute to misinforming the public about this species. As evidence of this misinformation, before visiting the zoo, visitors to the St. Félicien zoo tended to be totally unfamiliar with the important ecological role of wolverines as carrion eaters. Indeed, few participants in our study answered that wolverines eat carcass in the wild, despite the fact that carcases are their primary food source. Instead, many participants assumed they were primarily active hunters rather than scavengers, adding to the idea of wolverines as fierce killers. Furthermore, most participants overestimated the size of wolverines, artificially inflating their potential danger to humans.

As for the demographic variables we investigated, we found no significant evidence of repeat visitors to the zoo scoring higher on the knowledge section of the survey than first-time visitors to the zoo. This result was unexpected, but not unheard of as Balmford (2007) performed a study in which they found that informal learning, such as family visits to a zoo, seem to have little effect on the retention of factual knowledge about wild species. It would seem as though for adults, visiting a zoo may primarily be for entertainment, rather than a learning opportunity (Morgan and Gramann 1989; Clayton et al. 2009). The only demographic variable we investigated which was associated with knowledge about wolverines was sex: men

scored significantly higher than women. This is in accordance with the literature concerning gender and wildlife knowledge (Kellert and Berry 1987) and may be due to the tendency for men to spend more time in the wild than women, hunting and fishing (Tikka et al. 2000), particularly in northern Canada. Similarly, Randler (2010) found that animal-related leisure activities are correlated with species knowledge. A counter argument to this idea, however, could be that as residents of Quebec, very few of the survey participants were likely to have ever seen a wolverine in the wild, including hunters. However, men may be more familiar with other members of this taxonomic group and greater familiarity with any members of the Mustelidae family would likely have helped with the survey questions.

In terms of the expression of values toward wolverines, we found evidence of associations with the demographic variables we tested. Among these, age had the strongest association, with middle aged visitors to the zoo being more likely to express an appreciation for, and assign an intrinsic value to wolverines: the *Naturalist* value. Similarly, visitors under the age of 45 were more likely to describe the wolverine as a good-looking animal: the *Aesthetic* value. Both of these values are positively correlated with a willingness to support conservation work regarding wild species (Gunnthorsdottir 2001), which suggests that younger adults may be more willing to support wildlife conservation efforts. This result is consistent with claims by other authors that older people have a more negative attitude toward larger northern predators (Andersone and Ozolinš 2004, Røskaf et al. 2006, Campbell et al. 2011). Similarly, visitors that originated in cities with 500 000+ inhabitants were more likely to assign intrinsic value to wolverines than those originating in smaller communities via expression of the *Naturalist* value. This result is in contradiction with other authors (Ericsson and Heberlein 2003; Knight 2008) who found a link between the *Naturalist* value and exposure or interactions with animals. Indeed, proximity may have a negative effect in this case as repeat visitors to the zoo were more likely to view the wolverine negatively than those who had never seen the pair of wolverines at the St. Félicien zoo before. This was also documented by other research where direct exposure lead to less positive attitude (Heberlein and Ericsson 2008; Eriksson et al. 2015). It is possible, therefore, that people living in more urban areas may result in people placing more value on wildlife because of the lack of interactions they experience and a desire to be closer to nature. Alternatively, as most visitors to the zoo likely originated from within the Saguenay-Lac-Sainte-Jean region, a relatively

sparsely populated part of the province, they may have had greater exposure to local predators then first time visitors from more urban areas, and increased exposure to wild predators has been shown to be associated with a more negative attitude toward predator species (Heberlein and Ericsson 2008), potentially including the wolverine. Another explanation may be that because the wolverine exhibit is in the older section of the zoo, regular visitors to the zoo visit the wolverine exhibit less often, resulting in repeat visitors failing to reinforce the information they likely learned on their initial visit. This could explain why knowledge scores were not higher among repeat visitors. Also, when questioned further, repeat visitors admitted to being less interested and spending less time in the older section of the zoo where the wolverines are housed. Our observations support arguments made by other scholars (Mitchell et al. 1990; Fernandez et al. 2009; Moss and Esson 2010), that the location of an animal's enclosure plays a key role in motivation, attendance and awareness among zoo visitors. Also, even after answering a wolverine survey before visiting the zoo, not all participants actually visited the wolverine exhibit. This may be due to the presence of more emblematic or charismatic animals in the zoo such tiger or polar bear as not all animals species present within a zoo are equally appealing across a broad public (Rabb 2004; Small 2011, 2012; Skibins 2015; Carr 2016). In this case, personal preferences would certainly affected the degree of knowledge that can be acquired from a zoo and the potential of a learning program within a zoo (Moss and Esson 2010).

It therefore appears as though older generations living in less densely populated areas and which likely have more encounters with wildlife are in fact less likely to support wolverine conservation initiatives than younger generations living in more urban environments. While we cannot say with certainty why this distinction exists, one possible reason may be that people living in areas where a species has become extirpated, such as the wolverine in Quebec, are more exposed to stories about such wildlife that may include miss-information (Devitt et al. 2016), casting the species in a negative light. With age would come a greater familiarity with these stories, causing their implications to become personal opinion over time. Additionally, as most of our survey participants were from local communities in northern Quebec, this may explain why only one quarter of the participants assigned a level of biological importance to wolverines that was equal to that of more emblematic species such as

bear, wolf or lynx. Low levels of public support were also observed for wolverines relative to other predators in past work by Ericsson et al. (2007).

Even if wolverines are perceived negatively by the adult population in Quebec, repeat visits to a zoo containing wolverines did not directly increase the level of knowledge about wolverine, half of the participants in our study were still willing to pay for future wolverine conservation, stating the point that wolverines should be protected and that it was important for them to be able to see a wolverine in a zoo. A similar result was found by Tarrant et al. (1997) who find that people can have low knowledge about a species and still have a positive attitude toward its protection. Ours results seems to show the potential positive effect of the presence of this species in the zoo for monetary engagement (or wiliness to pay) in predator conservation. Captive wolverines can help to promote wildlife conservation and increase people's willingness to pay for conservation programs focused on wolverines. However, more studies are needed to understand the true place of captive animals, such wolverines, in zoos. After all, even species that remain negatively perceived by the public can still promote wildlife conservation by highlighting the importance of biodiversity. As Figari and Skogen (2011) point out, not all views need to reflect "*polarized attitudes*", people can express a "*nuanced viewpoint and ambivalent feelings*" about wildlife.

8.4.2 Children survey

The results of the children's survey suggest that overall, while participating in the summer camp offered by the St Félicien Zoo did not affect knowledge scores, it did have a positive effect on values attributed by children to wolverines. After spending 5 days in the zoo, learning about each of the species housed therein, children were significantly less likely to perceive the wolverine negatively. They were also more likely to consider the wolverine as a good-looking animal. Both of these characteristics are associated with increased support for conservation programs, in accordance with Myers et al. (2003) and supported by Yalowitz (2004) who demonstrated the strong impact that aesthetic experiences can play to motivate species conservation. Attending the camp did not, however has a significant effect on the opinion that wolverines play in terms of their scientific and ecological role and that environmental protection and awareness are important. This likely resulted from both of these

opinions already being common among children who express interest in summer camps at zoos. Interestingly, the expression of the *Usefulness* value toward wolverines was significantly lower among children who completed the survey after participating in the summer camp. While this seems promising at the surface, this result may have been the simple consequence of children learning during the camp that wolverines are no longer present in Quebec. In which case they may have been assessing the usefulness of a species that in their minds, only exists in the zoo.

Children with a pet at home were more knowledgeable about wolverines and were more likely to express an aesthetic appreciation of this species than those without a pet at home. This result was consistent with our hypothesis and with past works with children that found owning a pet improves attitudes toward wildlife and increases knowledge and understanding of animals (Kellert and Westervelt 1984; Eagles and Muffit 1990; Paul and Serpell 1993; Bjerke et al. 2003). Thus, unlike the adult surveys above, the results of the children's surveys do suggest that increased exposure to animals (wild, domestic, or those within the zoo) has a strong positive influence on factors correlated to support for potential wildlife conservation programs. This may represent a potential avenue to increase public support for wildlife conservations where it is particularly low.

Age played a role in the distribution of knowledge, with older children acquiring more knowledge with time and scoring higher on the knowledge section of the survey. Age was also positively associated with an appreciation for nature: the *Environmental Protection and Awareness* value, suggesting that older children are also more aware about environmental protection and nature conservation. Both of these findings are promising, and may simply be the result of differences in the school curriculum across ages. Together, these findings add to this wider base of literature that support arguments about the effectiveness of zoos in place-based learning which may ultimately enhance visitors support for conservation initiatives concerning predators, such as wolverines (Clayton et al. 2009).

Contrary to the adults, working with children in our study required special consideration and adaptation when designing scientific surveys. Our survey protocol with children required holding their attention for an extended period of time. In our study, it was therefore not feasible to survey individual children both before and after attending the summer camp, as their willingness to complete a survey a second time was quite low and produced

poor results. Rather than jeopardized the interpretation of the results we opted to assign groups of children to into two groups, one which had attended the summer camp and another which had not yet attended a camp. As a consequence, sample sizes differed among the two groups which may have restricted our ability to detect differences that were present, and we could not directly measure the effect of attending a summer camp at the zoo at the individual level.

That we did find significant results, however, is evidence that the effect of a guided learning experience at a zoo is considerable, at least over the short term. Future studies may find a more streamlined approach which can hold the attention of children long enough to permit surveying of each child multiple times: before, after, and sometime in the future to assess long term effects.

8.5 Conclusion

By issuing surveys to adults and children at a prominent zoo within Canada, we have gained valuable insights into how the Canadian public views a little known and often misunderstood predator; the wolverine. As visitors to the zoo likely already expressed some willingness to support conservation, due to their choice of family outing, it was encouraging to find that visiting the zoo and experiencing the animals first hand positively influenced this tendency by promoting values that are strongly associated with biological conservation. As Derwin and Piper (1988) stated, exposure to exhibits that promote wildlife conservation do positively affect zoo-goer's willingness to donate to such causes. We would argue that this claim can be extended to include outreach programs aimed at children, particularly since the values and attitudes expressed by children later in life are the result of ideas, opinions, and interactions experienced early in life (Owens 2005). Ours results also suggest that having a pet should be encouraged among children as it was strongly correlated with increased interest and understanding of animals. Indeed, owning a pet was positively associated with a greater expression of values strongly linked to support for conservation. Additionally, as the learning potential of a species in captivity is directly linked to its attractiveness to the general public (Moss and Esson 2010), any factors which increase the appeal of wolverines is likely to also increase support for its conservation. Furthermore, while knowledge about a species is typically considered among the strongest indicators for appreciation and support for its

conservation, this study demonstrated that even when misconceptions abound, people may still be quite willing to support for conservation. Seeing a wolverine in a zoo may not, therefore, dispel all misconceptions about this species or increase the long-term knowledge people retain about it, but it does positively affect their attitudes toward them, as has been observed with other species in zoos (Røskaft 2007).

Care should be taken, however, in how species of conservation concern are integrated into zoos as those that find themselves in less appealing enclosures, or sections of a zoo, may receive less attention from zoo visitors, negatively influencing their opinions of that species. More studies are needed to evaluate the contribution of zoos in the conservation of wolverines and other misunderstood species as their capacity to encourage learning about such species among both children and adults, may have far reaching effects with regards to conservation efforts. Ultimately, biologists, wildlife managers, and animal conservationists can gain from working in collaboration with zoos, who offer an exclusive opportunity to connect with wolverines, to promote species awareness and create educational programs to promote social acceptance for this misunderstood species.

La bibliographie relative à cet article se trouve à la fin dans les références

Chapitre 9 Conclusion

Cette recherche s'intéresse aux relations humanimales Carcajou et ce chapitre 9 présente l'originalité et l'importance de cette thèse dans l'étude de ces relations humanimales. Ce chapitre revient aussi sur les différents articles correspondant chacun à un chapitre. La contribution de cette thèse et les futures perspectives de recherche seront aussi détaillées.

9.1 Originalité et importance de l'étude

Dans cette recherche nous nous sommes intéressés aux liens unissant un animal emblématique comme le carcajou et les sociétés humaines. En effet, le carcajou, animal peu connu du public (Banci, 1994; Ruggiero et al., 2007), est aussi une espèce qui, comparativement à d'autres carnivores comme le loup, l'ours ou le cougar, a été peu étudiée (Inman et al., 2011; Persson et al., 2009; Ruggiero et al., 2007) et dont les populations ont fortement diminuées, voir même disparu de certains territoires au cours du dernier siècle (Banci, 1994; Fortin et al., 2005; Kvam et al., 1988). Ce carnivore, est une espèce importante de la biodiversité et des territoires sauvages et son statut de charognard/prédateur en fait une espèce clé. Afin de pouvoir mener à bien des programmes de conservation et de gestion de l'espèce, il faut intégrer les populations locales aux processus de décision et de participation active en vue d'obtenir les meilleurs résultats et de bénéficier d 'un soutien accrue des communautés (Bath & Enck, 2003; Bonacic, 2008; Bright, Manfredo, & Fulton, 2000; Campbell & Alvarado, 2011; Ericsson, Kindberg, & Bostedt, 2007; Kellert, 1985; Kretser et al., 2009; Milenković, 2008; Treves et al., 2006; West, Igoe, & Brockington, 2006). L'implication des résidents est indispensable au bon fonctionnement des mesures de gestion des espèces animales et même si cela ne garantit pas le succès, cela permet au moins de s'en approcher (Ericsson, Kindberg, & Bostedt, 2007; Decker, Lauber, & William, 2002). Afin d'intégrer correctement les sociétés aux plans de gestions, il faut comprendre leurs liens, leurs valeurs, leurs perceptions, et leurs relations envers les espèces avec lesquelles elles cohabitent. Dans ce projet, nous avions donc comme objectif de mieux comprendre les relations entre sociétés et carcajous dans le Nord canadien pour assurer la protection et la gestion efficace et adéquate de cette espèce, adaptée au contexte socioculturel. (voir chapitre 1).

La mise en perspective de trois terrains, les Territoires du Nord-Ouest (ou le carcajou est omniprésent), le Nord du Québec (ou le carcajou est absent depuis plus de 40 ans), et le zoo St-Félicien, seul zoo au Canada qui abrite un couple de carcajou (site de conservation ex-situ), a permis de mieux comprendre les rapports, les perceptions, les valeurs et les attitudes humains-carcajous ainsi que les enjeux liés à la gestion de ce mustélidé en lien avec les différentes dynamiques territoriales.

D'abord, nous nous sommes intéressés aux attitudes et aux valeurs des sociétés autochtones Dénées et Métis des Territoires du Nord-Ouest qui partagent leur territoire avec le carcajou. Ensuite, nous avons analysé et comparé le degré de connaissance et la perception qu'avaient les enfants, des écoles élémentaires des Territoires du Nord-Ouest, envers le carcajou puisque ce sont eux les futures générations qui soutiendront la gestion de la faune. Puis, nous avons étudié les représentations sociales du Carcajou à partir de dessins réalisés par les enfants (autochtones et non autochtone) avec un regard croisé sur les Territoires du Nord-Ouest et le Nord du Québec. Enfin, nous avons analysé le rôle du carcajou au sein du zoo dans la conservation ex-situ, sur les connaissances et la motivation du public québécois (lors de leur visite au Zoo de St Félicien) ainsi que les enfants participant à un camp au zoo de St Félicien. En utilisant différentes méthodes (entrevues semi-dirigés, questionnaires semi-ouverts, et dessins), nous avons pu évaluer le degré de connaissance les valeurs et les attitudes des sociétés locales envers le carcajou, afin de permettre une meilleure compréhension de l'acceptabilité sociale du carcajou et la motivation/volonté des populations envers la conservation du carcajou et son habitat.

9.2 Conclusion des différents chapitres

9.2.1 Chapitre 5

Les entrevues réalisées avec les trappeurs Dénés et Métis habitant les communautés de Ndilǫ et Dettah, et la ville de Fort Smith dans les Territoires du Nord-Ouest, ont permis de mieux comprendre les multiples liens les unissant à cet animal. L'analyse des entrevues et questionnaires ont révélé que leurs connaissances sur le carcajou étaient extrêmement complètes et détaillées. Non seulement, leur description du carcajou est très précise, mais ils reconnaissent aussi son rôle écologique et sont conscients des impacts climatiques et

anthropiques pesant sur la dynamique de populations de cette espèce et de son habitat. Leurs relations et interactions avec le carcajou sont néanmoins complexes. L'animal est admiré pour sa force, son courage et son intelligence, mais il est aussi décrit comme un voleur et un « malin », capable de prendre différentes formes afin de jouer des tours aux humains. La collecte de différents récits, légendes et anecdotes, et l'analyse de discours, a mis en lumière que le carcajou n'est pas vu comme un animal mais comme un être vivant cohabitant avec les Dénés et les Métis et dont le rôle culturel et spirituel en plus du rôle écologique est important dans la cosmovision et que cela façonne les relations qu'entretiennent les trappeurs avec leur environnement. Comprendre ces relations individu-communauté-carcajou est essentielle afin de trouver et d'appliquer des stratégies de gestion mieux adaptées au contexte local et culturel. Loin d'être une relation conflictuelle, l'animal est très respecté dans le monde Déné et Métis. Les savoirs détenus par les trappeurs Dénés et Métis sont un complément utile au savoir scientifique collecté par les biologistes. En effet, de nombreux trappeurs participants à cette étude savent localement où trouver le carcajou dans les vastes espaces des Territoires du Nord-Ouest, en plus de leurs connaissances sur le comportement de l'espèce. Intégrer les savoirs Dénés et Métis aux savoirs de la science occidentale (p.ex. suivi de l'espèce) et inclure la participation des trappeurs Dénés et Métis dans les stratégies de gestion et conservation des espèces est un bon moyen pour réaliser des recherches plus respectueuses, où les sociétés locales auraient leur mot à dire sur la gestion des espèces qui partagent leur territoire.

9.2.2 Chapitre 6

Dans ce chapitre, nous nous sommes intéressés à la perception qu'avaient les enfants des écoles élémentaires des Territoires du Nord-Ouest sur le carcajou. Aucune recherche de ce type n'avait été effectuée auprès d'enfants. S'inscrivant dans la nouveauté, nous avons utilisé des questionnaires ludiques adaptés aux jeunes et nous avons pu analyser leurs perceptions de cet animal et leur degré de connaissance. Les résultats obtenus montrent que les enfants n'ont pas tous les mêmes connaissances selon l'endroit où ils résident. En milieu urbain, où les valeurs envers le carcajou sont en général plus positives, mais où le degré de connaissance de l'animal est plus faible, mettre en place des programmes d'éducation et de connaissances de cette espèce pourrait permettre d'augmenter le soutien des jeunes envers les programmes de

conservation. À l'opposé, les enfants vivant dans des communautés rurales ont de bonnes connaissances envers les animaux, notamment le carcajou mais ils ont aussi des opinions plus négatives envers ce dernier. Les enfants trop jeunes pour pratiquer seuls des activités de plein air (chasse, trappe…) ne peuvent pas rentrer en conflits directement avec le carcajou, mais leurs attitudes sont quand même influencées par les histoires que racontent les adultes sur cet animal. Les efforts devront donc être plutôt centrés sur l'amélioration de l'opinion publique (notamment les enfants) vis-à-vis des espèces conflictuelles. De plus, il faudrait aussi pouvoir changer la perception des adultes envers le carcajou (le dédommagement par le gouvernement des pertes de bétail imputables aux carcajous pourrait être un bon exemple pour contrer les attitudes négatives envers cet animal). Si les adultes sont plus favorables à la présence du carcajou, il est fort possible, que leurs enfants le soient aussi. La meilleure façon d'y parvenir serait d'adapter les plans d'action à chaque communauté, chacune ayant un contexte culturel différent, en intégrant la participation du public dès le début du projet et en lui donnant toute l'information nécessaire sur cette espèce.

9.2.3 Chapitre 7

Dans ce chapitre, nous avons étudié les représentations sociales liées au carcajou en effectuant une analyse picturale des dessins d'enfants (entre 8 et 12 ans) concernant le carcajou et son habitat. Cette méthodologie porte en général sur plusieurs espèces animales ou sur l'environnement en général. Ce qui nous distingue des autres recherches utilisant des dessins, est l'utilisation d'une seule espèce carnivore : le carcajou et sa représentation dans son environnement. Cela, nous a permis d'étudier et de comparer comment le carcajou était perçut et dessiné par les jeunes générations de deux aires d'études différentes ponctuées par la présence et l'absence du carcajou : les enfants Dénés dans les Territoires du Nord-Ouest et les enfants Naskapis au Nord du Québec. Nous aurions pu penser que l'utilisation de cette méthodologie dans un environnement où le carcajou n'était plus présent (le Nord du Québec), aurait pu accroître la difficulté pour les enfants Naskapis de représenter une espèce absente, mais, en fait cela n'a pas été le cas dû probablement à la mémoire collective des Naskapis envers le carcajou.

Les résultats ont démontré qu'il n'y avait pas de différence notable dans la représentation de l'habitat du carcajou. En revanche, dans la représentation du carcajou, quelques différences existent entre la Nation Dénée et la Nation Naskapie.

Sur la plupart des dessins, le carcajou est seul dans son environnement, parfois il est représenté avec une proie. Les carcasses et les caribous ont très peu d'importance dans les dessins et sont très peu représentés avec le carcajou, ceci pourrait s'expliquer par la diminution des troupeaux de caribous ou le manque de connaissance sur ce que mange l'espèce. Le carcajou est bien représenté comme un mammifère mais peut décrit comme un carnivore. Ainsi au Québec, contrairement aux NWT, le carcajou n'est pas vu comme un prédateur qui chasse ; ceci s'explique par le fait que même si cet animal est connu des Naskapis, dont les histoires[34] sont racontées à la radio, et dont les légendes sont transmises de génération en génération au sein de la communauté, les enfants ne pensent pas à représenter le carcajou comme un prédateur en train de chasser une proie, contrairement aux enfants Dénés qui en comparaison dessinent le carcajou plus souvent en train de chasser ou avec des caractéristiques de prédateur. Les enfants ont une bonne connaissance du milieu dans lequel vit le carcajou, à savoir la forêt ou la toundra. Les dessins nous ont permis de comprendre un peu mieux la représentation que se font les enfants, du carcajou.

9.2.4 Chapitre 8

La recherche au sein du Zoo de St Félicien (qui a pour mission d'éduquer le public sur les espèces animales), nous a permis d'interroger le public québécois sur le carcajou et de comprendre : le rôle du carcajou dans la conservation ex-situ et la perception des populations envers cet animal et leur motivation pour sa conservation.

Le zoo de St. Félicien est le seul endroit au Canada où le public peut voir des carcajous en captivité. Même si un couple de carcajou évolue au sein d'un enclos du zoo, il reste très méconnu du public ; de plus de nombreux préjugés circulent sur le carcajou, si bien que cet animal n'est pas toujours vu de façon très positive. Chez les enfants, le camp nature du zoo de St Félicien semble contribuer à augmenter le degré de connaissance sur le carcajou et aurait un

[34] Tire d'un livre parut par la nation Naskapie en 2013, intitulé : Naskapis wolverine legends de Peastitute

effet positif sur l'expression de la valeur esthétique du carcajou : les enfants le trouvant beau. Ce résultat contraste avec le fait que chez les adultes ayant visités le zoo à maintes reprises, l'attitude négative envers le carcajou semble persister. Un autre facteur très important à prendre en compte est la position du carcajou à l'intérieur du zoo. Les carcajous se trouvent dans la partie la plus ancienne du zoo, cette partie située un peu à l'écart et proche de la sortie est souvent boudé par les visiteurs ayant déjà visités le zoo à maintes reprises. Si le but d'avoir un carcajou dans un zoo est d'informer et de sensibiliser le public à cette espèce, il conviendrait donc de repenser la place du carcajou au sein du zoo afin que les visiteurs ne puissent pas éviter cette zone et ainsi accroitre leur intérêt envers cette espèce. Bien sûr, placer une espèce comme le carcajou au cœur d'un zoo demanderait des études sur la faisabilité d'un tel projet dans le respect du comportement de cette espèce avec un aménagement adéquate. La valorisation d'une espèce en jardin zoologique passe par le paysage et l'aménagement de l'enclos et de ses alentours ; ce sont des conditions essentielles qui vont permettre la mise en valeur d'une telle espèce.

Le carcajou est un animal qui pourrait bénéficier, du fait d'être présent dans un zoo, d'une attitude plus positive des populations envers sa conservation. En effet, il est plus facile d'adhérer à la protection d'une espèce quand elle est visible, d'où l'intérêt de garder un couple captif de carcajou au sein du zoo et de dispenser de l'information non pas seulement sur sa biologie mais aussi sur son comportement et les légendes traditionnelles qui s'y rattachent, afin de démystifier cette espèce.

9.3 Contributions de cette recherche

Au niveau théorique, cette recherche a enrichi la littérature sur les relations et les interactions humanimales dans des contextes socioculturels différents. Toute cette thèse s'articule autour de ce nouveau concept des relations humanimales permettant son approfondissement. Le choix de différents terrains a permis de souligner les différentes facettes de ces relations humains-carcajou. En effet, le carcajou se positionne comme une espèce importante que cela soit pour les trappeurs Dénées ou Métis ou bien encore les visiteurs québécois de zoo. Pour les chasseurs-trappeurs autochtones (voir chapitre 5), le carcajou est bien plus qu'un simple animal à fourrure, admiré pour sa ténacité, son courage, il

peut aussi devenir guérisseur, protecteur, guide spirituel ou bien encore son rôle de charognard est vu comme indispensable pour l'équilibre des milieux (voir chapitre 5 et 8).
Cette étude a aussi permis une intégration des savoirs locaux à la science occidentale (voir chapitre 5) afin de montrer l'importance de créer un espace pour que les voix autochtones puissent être entendues afin de comprendre la place contemporaine et historique occupé par le carcajou dans ces relations humains-carcajou.

Cette thèse propose donc une nouvelle façon de traiter les relations humanimales en intégrant aussi les jeunes populations locales, et en offrant de nouvelles perspectives. Ainsi le carcajou est aussi vu comme un animal indispensable à la biodiversité (voir chapitre 6), il est aussi représenté comme un animal habitant des régions sauvages non habités, (chapitre 7). Sa représentation par les enfants de différentes Nations (chapitre 7) permet une meilleure compréhension de la vision de cet animal par les jeunes générations qui cohabitent ou pas avec lui et qui plus tard pourront promouvoir sa conservation à titre d'espèce au statut préoccupant ou en voie de disparition.

Cette recherche a permis de poser différents regards sur ces relations humanimales carcajou en incorporant différents champs de recherches multidisciplinaires afin de non pas se concentrer sur un seul aspect mais bien sur les multiples facettes de ces relations humanimales au Canada. S'insérant dans un nouveau courant de pensée des relations humanimales, cette thèse propose non pas une seule façon de voir le carcajou, mais bien plusieurs façons de percevoir cet animal en fonction du contexte socio culturel, de la localisation géographique et des différents acteurs (adultes, enfants, autochtones, non-autochtones, chasseurs/trappeurs).

Cette étude doctorale s'inscrit aussi en plus dans une perspective de géographie animale où le carcajou est placé au cœur de la recherche afin de comprendre son rôle dans la culture et l'identité, ainsi que les différents sens donné à cette espèce et les émotions qu'ils suscitent par les populations locales. Elle vient aussi renforcer la définition du concept de la géographie de la conservation en offrant de nouvelles perspectives sur les espèces emblématiques. En effet, nous ne nous intéressons pas seulement aux populations locales adultes, mais aussi aux enfants qui seront les futurs acteurs de demain et qui non seulement auront leur mot à dire sur la gestion et la conservation des espèces, mais seront aussi impliqués dès leur plus jeune âge dans la mise en place de programme d'actions sur les espèces. A l'heure actuelle, avec la crise que traverse la biodiversité, il convient d'agir avec toutes les

populations humaines, jeunes générations comprises puisqu'elles sont l'avenir de notre Terre. Le succès d'un programme de maintien d'espèces sensibles se fera sur le long terme et pour en assurer la réussite il faut que les jeunes soient inclus dès le début du programme, afin de les informer, de les sensibiliser et de les mobiliser.

Au niveau méthodologique, la combinaison de différentes méthodes qualitatives et quantitatives ont permis d'avoir une vision globale des relations humanimales carcajou au Canada. Les dessins d'enfants nous ont permis d'aller au plus près des représentations sociales du carcajou par les enfants. Cette recherche a également proposé une nouvelle typologie de valeurs liée à la nature qui permet de mieux analyser la motivation de protéger la faune et son habitat.

Au niveau empirique, cette étude multi-site caractérisée par un travail sur trois aires de répartition où le carcajou a un statut de conservation différent : a) une aire d'étude où le carcajou est localement présent, b) une aire géographique où le carcajou a disparu et c) un lieu de conservation ex-situ, comme le zoo a permis de dresser un portrait plus global des relations humains-carcajous dans le Nord canadien et d'identifier des modes de gestion de ce prédateur et de ses usages. L'analyse multi-acteurs, où nous nous sommes intéressés : 1) aux trappeurs Dénés et Métis dans les Territoires du Nord-Ouest qui cohabitent avec les carcajous, 2) aux enfants (autochtones ou non autochtones) des Territoires du Nord-Ouest et du Québec (autochtone) qui représentent les futures générations d'acteurs qui interviendront dans la conservation et la protection de la faune sauvage et 3) aux populations locales québécoises qui pourront être impliquées dans des programmes de gestion du carcajou si ce dernier revient recoloniser le Québec, nous a permis d'avoir de meilleures connaissances sur les rapports qu'entretiennent les sociétés avec cet animal.

Au niveau de la science appliquée, cette étude a permis d'identifier des modes de gestion spécifiques et des meilleures stratégies de conservation in-situ et ex-situ du carcajou. Elle a également identifié des pistes pour développer des programmes d'éducations environnementales pour enfants afin de rendre cet animal plus populaire et moins cryptique.

Enfin, en termes de transférabilité des observations effectuées pendant cette recherche, l'approche et les méthodes utilisées peuvent s'adapter à d'autres espèces de carnivores emblématiques comme le pékan ou le cougar.

9.4 Futures perspectives de recherches

Au Canada, de futures recherches pourraient avoir lieu dans de plus grandes villes comme Calgary ou Vancouver[35] en échantillonnant un plus grand nombre de participants ; mais aussi dans des communautés plus éloignées comme Inuvik ou Gaméti. Inuvik permettrait d'interroger d'autres Nations comme les Inuits sur leur rapports avec le carcajou (L'Hérault, 2018). Actuellement, le carcajou se situe très proche de la frontière Ontario-Québec au sud de la baie d'Hudson et il est très probable que son aire de répartition s'étende et qu'il arrive au Québec dans les années à venir, si ce n'est pas déjà le cas (COSEPAC, 2016). La Nation Cri, serait ainsi potentiellement les premiers du Québec à devoir cohabiter avec cet animal. Dans ce contexte précis, il serait intéressant d'effectuer une étude sur leurs perceptions envers cet animal. Nous pourrions aussi étendre cette recherche, et effectuer une analyse comparative circumpolaire, en introduisant les populations Sámis de la Scandinavie et les populations autochtones d'Alaska et ainsi avoir une perception globale internationale des sociétés et du carcajou.

Enfin, l'étude du public québécois non-autochtone pourrait aussi s'étendre dans le reste du Québec, en ciblant d'autres villes et la métropole afin d'avoir un aperçu global de ce que pense du carcajou les populations du Québec. Il ne serait pas possible d'étendre la recherche à d'autres zoos au Canada, le carcajou n'étant présent que dans le zoo de St Félicien. Mais il serait envisageable, d'analyser la perception du public de zoo en Amérique du Nord et de réaliser une recherche dans d'autres zoos présentant des carcajous, comme le Northwest Trek Park (Washington), l'Alaska Zoo (Alaska) ou bien encore le NY State Zoo (New York).

Le carcajou reste un animal emblématique et mystérieux pour les habitants du Canada, peu de gens ont eu la chance de voir un carcajou dans la nature, mais cet animal est présent dans beaucoup de légendes, histoires ou anecdotes. Tantôt admiré ou détesté, il n'en reste pas moins que le carcajou occupe une place unique au Canada, de par sa présence fantôme, liée à sa biologie et à son comportement, même si on ne le voit pas il est omniprésent et il fait sans conteste toujours parler de lui.

[35] Étant donné que ce sont les plus grandes villes à l'Ouest (pour traiter la question de population urbaine)

"*Wolverines are very intelligent animal, They don't attack, they are solitary animals, very elusive. If you see them, you see them. Sometimes people don't see them for years, but the wolverine sees people out there. Hiking or travelling in the wilderness, exploring, It sees you but it is not going to make a sound. It is a legend, a living legend"* (Fred Sangris, Ndilo, 2014)

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Annexe 1 - Questionnaire pour les Premières Nations des Territoires du Nord-Ouest

Questionnaire: Wolverine project

Age range: ___18-30; ___31-45; ___; 46-59; ___ +60

Sex : ___F; ___M

Level of education: ___basic education; ___high school, ___post secondary

Metis_____; Dené_____ ; other _____

SECTION 1: Carnivores

1 Which of the following carnivores have you seen the most?

___bears, ___wolves, ___lynx, ___wolverine, ___others

2 How do you consider the relation between carnivores and people to be?

___ positive, ___ negative, ___neutral, ___I don't know ; can you explain: _____

_____

3 Have you ever experienced a problem with carnivores? ___ yes; ___ no

If yes, what sort of problem did you experience: _____

SECTION 2: Wolverine

4 Do you know any other names for the wolverine? ___ yes ; ___ no

If, yes, which: _____

5 How would you describe a wolverine physically: _____

6 Choose from the list below the 3 main characteristics that describe a wolverine best select as many words as you want

___foolish ___dangerous

___ferocious ___thief

___intelligent ___ beautiful

___in danger of disappearing ___important for our ecosystem

___in need of protection ___ important to our culture

___ important for our economy ___they have the right to exist like any other animal

___they are unnecessary

7 If wolverines disappear from the NWT, how do you think this will affect the territory?

___it will be a good thing

___ it will be a bad thing

___ it will have little effect in the end

Please, explain _____

8 Have you ever seen a live wolverine? ___ yes; ___ no

if yes, where:_____ *when*:_____

9 Do you personally think wolverine is important? ___ yes; ___ no

Please, explain:_____

SECTION 4: Threats

10 Have you observed wolverine using or avoiding areas that have been altered by industrial activity or developments? ____ yes; ____ no

If yes, please explain, _____

11 Have you observed noise or light disturbances (e.g. from aircrafts, ATVs, Skidoos, or industry) affecting wolverine in your area? ____ yes; ____ no

If yes, please explain:_____

12 Which threats stand out to you as having the most important impact on wolverine?

_____

13 Today, do you think wolverines are:

___ increasing; ___ decreasing; ___ the same; ____I don't know ;

Can you explain: _____

14 Do you think the wolverine should be listed as an endangered species? ___yes, ___no

Please, explain:_____

15 Do you agree or disagree with the following statements

	Agree	**disagree**	**NA**	**explain**
I would like to see a wolverine				
Wolverine is good				
Wolverine is dangerous to me				
Wolverine is dangerous for other animals				
Wolverine is important, even if I rarely see				

one				
Wolverine is important in our ecosystem				
Wolverine has a symbolic value in our culture				
Wolverine is good looking animal				
Wolverine is necessary for our community (fur, ceremonies, stories…)				

SECTION 5: Conservation

16 On a scale of 1 to 10, where 10 indicates a high conservation value and 1 low conservation value, how much points would you give to a conservation project for each carnivore below? Ex: 5/10 bird, 3/10 fish, 1/10 insect, 1/10 spider

Wolverine _____/10**,** Wolves _____/10

Bears _____/10, Lynx _____/10

17 Would you be willing to pay for a conservation project for wolverines? ___ yes; ___no

23 a If yes, how much were you willing to pay (one payment)

____ 1$, ____ 5$, ____10$, ____15$, ____50$, ____100$, ____200$,____500$

SECTION 7: Hunting habits

18 Do you currently hunt? ___ yes ___ no

<u>If yes:</u>

18a Do you generally hunt for: ___ sport; ___ main source of food; ___ to supplement your food supply

18b What animals do you hunt?

___caribou, ___muskox, ___moose, ___wolves, ___coyotes, ___lynx, ___ bears, ___wolverine

18c Do you currently hunt wolverines: ___yes, ___no

<u>if yes</u>

18d Compared to when you were 16 years old, do you catch: ___ More wolverines; ___ The same amount; ___ Fewer wolverines

18e Can you explain why do you hunt wolverines?

_____

18f If the government limits hunting and trapping of wolverines, would you continue to hunt them as before? ___yes, ___no

18g If yes, why? _____

19 Wolverines are known to steal prey from traps. How can this affect you?

___ A family can lose all their hunting income,___ A family can be moderately affected?

___ This lost can be recovered, ___ This lost has no impact, ___ I don't know

20 Do you currently trap? ___ yes ___ no

21 How many prey would you have to lose before you will agree to kill a wolverine?

___ *none,* ___ *1 to 5,* ___ *more than 10,* ___ *I will never kill a wolverine*

22 What solution do you think could work to protect your trapped prey?

___ protect the trap

___ received a money compensation for my lost

___ from the federal government

___ from the NWT government

___ from the local government

___ from other hunters

___ scare wolverine away

___ move the animals somewhere else

22a How? Do you have some idea?

_____

_____

Annexe 2- Grille d'entrevue pour les Premières Nations des Territoires du Nord-Ouest

Interview: Wolverine project

GENERAL INFORMATION

age class:____18-30, ____31-45, ____46-59, ____ +60

sexes : ____F, ____M

Level of education: ___basic education; ___high school, ___post secondary

Domestic animals: ____ yes, ____no

what kind of animals? _____

THEME 1- Environment where the person live

When you were a young adult, how was the weather? Are the winter/summers longer, cooler? quantity of snow? first snowfall?

What were the animals like? Abundant? And the forest? Did it changed over the years?

Do you think we should protect the environment? wildlife? why?And the people? the city of Yellowknife?

THEME 2 – value, knowledge

Where can we see a wolverine? How do they live? What do they eat?

What do you like about the wolverine? Or dislike? Would you want to see a wolverine in the wild? Why?

Do you think wolverines are necessary? If wolverines disappear, will you feel something?

since when do you trape or hunt? Where? With who, friends, children, alone?

THEME 3 - conflicts

And the wolverine? Do you think they can have a place in the wild?
How wolverine influence the way you live? Did you ever experience a conflict with a wolverine? How can be you sure it was a wolverine? Why do you think the wolverine was attracted?

THEME 4 – carnivorous role and cultural aspect

Do you know any ceremony involving wolverines? Are the wolverines an important animal in your culture?
Do you use the word wolverine for something else than the species? For example, name some people, value, habits, or some place.

Annexe 3 - Atelier scolaire (pour les écoles élémentaires des Territoires du Nord-Ouest)

Questionnaire: Wolverine project – *some questions were removed later one, due to a lack of answer.*

Answer or circle your answer

sex : girl boy

age : _____

How long have you lived in Yellowknife? _____

Do you have a pet? yes no

My pet is: _____, **its name is:** _____,

Grade: 3 4 5

What is your origin? NWT resident NWT resident, indigenous other

1 Among the animals in the NWT, which is your favorite?

_____

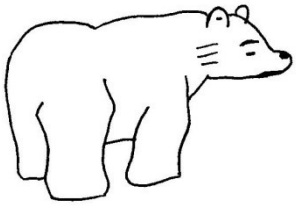
Why?_____

2 Which animal do you like the least from the NWT?

_____

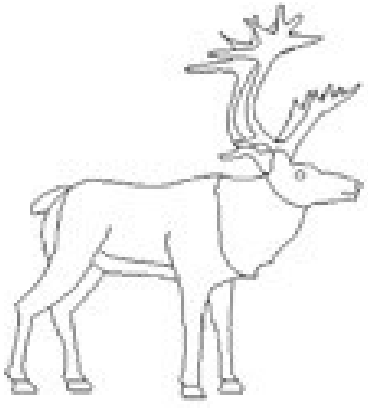
Why?_____

3 Can you tell me how you feel about the following animals? Circle your answer. Try to name each animal.



I like I dislike

_____



I like I dislike

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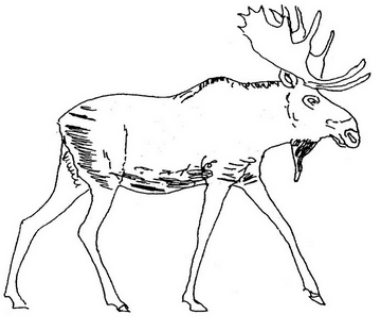

I like I dislike

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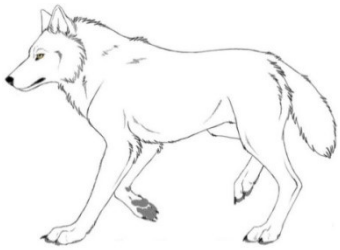

I like I dislike

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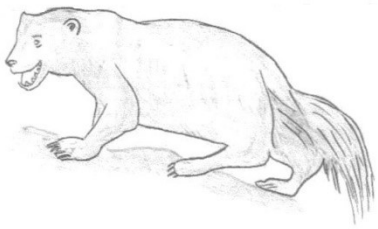

I like I dislike

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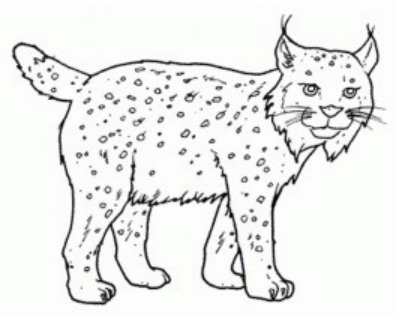

I like I dislike

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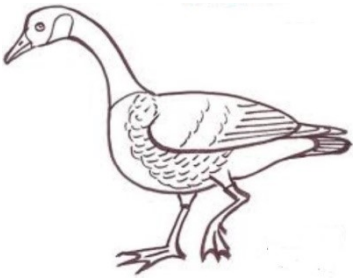
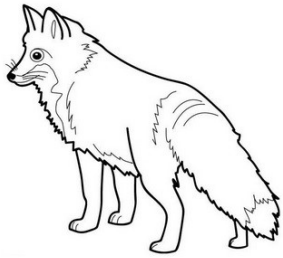


I like I dislike

_____



I like I dislike

_____

I like I dislike

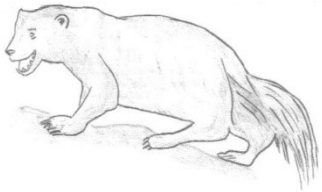
_____

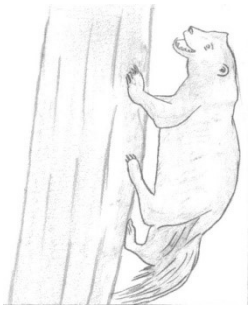
4 Do you recognize this animal? yes no

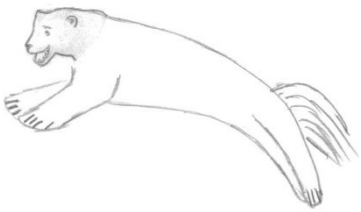
Which animal is it? _____

5 Color the region(s) on the map where you thing wolverines live and put a cross where you live.

6 Which of the following methods of movement do wolverine use (Circle all that apply)







7 Do you think wolverine cubs hatch from eggs? Circle your answer.

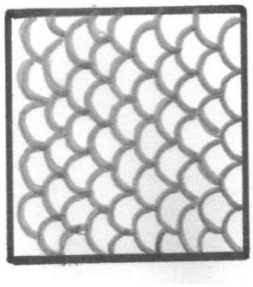
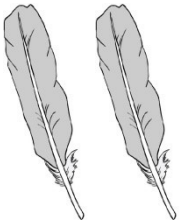
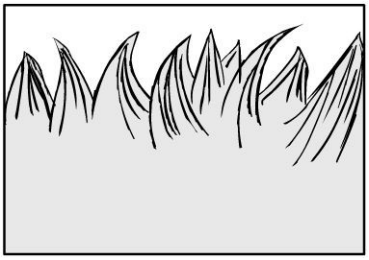
yes no

Can you explain why?

_____

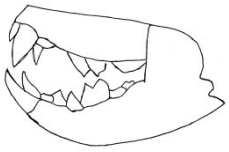
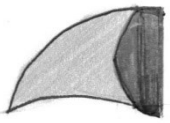
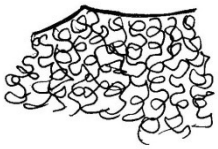
_____

8 What cover's the wolverine's skin (scale, feather, hair)? Circle your answer.

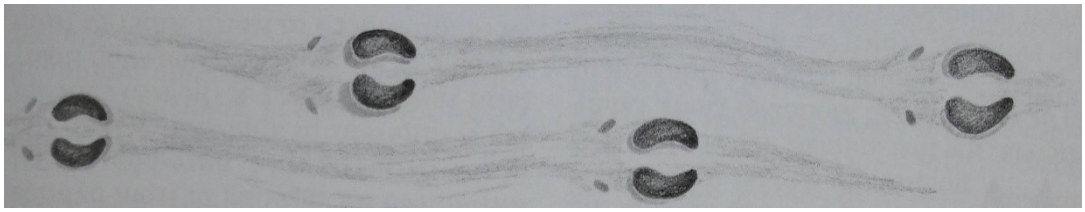
9 Which of the two choices best match the wolverine's hair, eyes, teeth, and claws? Circle your answer.




10 Can you identify which tracks belong to a wolverine? Write down which tracks belong to the following animals: wolverine, bear, rabbit, caribou

_____ (one name of animal)

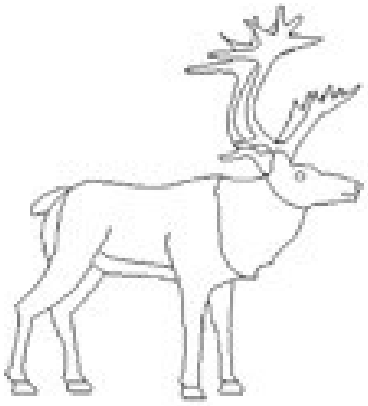


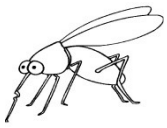
_____ (one name of animal)

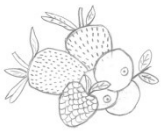
_____ (one name of animal)

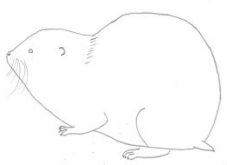
_____ (one name of animal)

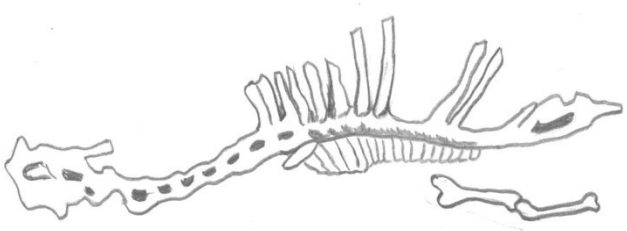
11 Circle which items you think wolverines eat? (it can be more than one answer)



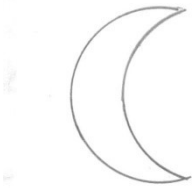


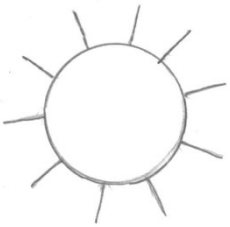






12 Do you think wolverines are most active during the day (diurnal) or the night (nocturnal). Color your choice below.





13 In what kind of environment do wolverine's live? Circle your choices below. (it can be more than one answer)

14 Would you like to meet a wolverine in the wild? yes no

Why?_____

15 Do you think wolverines are dangerous? yes no

Why?_____

16 Do you think the wolverine is an important species for its fur? yes no

Why?_____

17 Do you think the wolverine is an important species its role in stories, myth and/or ceremonies? yes no

Why?_____

18 Do you think we should hunt wolverines? yes no

Why?_____

19 Do you think all species are important? yes no

Why ?_____

20 Is the wolverine a good looking species? yes no

Why?_____

21 Do you think we should protect wolverines? yes no

If yes, why and what can you do to protect wolverines?

_____

22 How do you think your environment will change when you will be an adult?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Annexe 4 – Dessins (pour les enfants des Territoires du Nord Ouest et du Nord du Québec)

Please draw me a wolverine in his environment

Explain your drawing:

My drawing shows:

Annexe 5- Questionnaire pour les enfants participant au camp du zoo de St Félicien

Questionnaire: Projet sur le carcajou

Réponds aux questions et entoure tes réponses

Je suis: une fille un garçon

Age: _____

Depuis combien de temps habites-tu au Québec: _____

As-tu des animaux domestiques? oui non

Mon animal est: _____

Quelle est ton origine ? résident du Québec résident du Québec et autochtone autre

1 Quel animal préfères-tu au Québec? Cites en juste un?

_____**Pourquoi?**_____

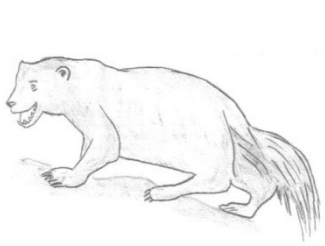
2 Quel animal aimes-tu le moins au Québec? Cites en juste un?

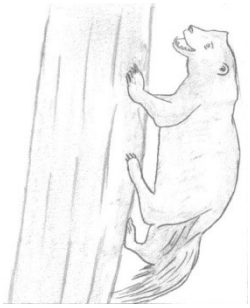
_____**Pourquoi?**_____

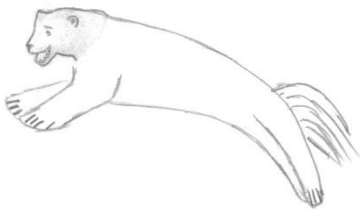
3 Reconnais-tu cet animal? oui non

Quel est son nom? _____

4 Comment se déplace le carcajou? Entoure tes réponses.







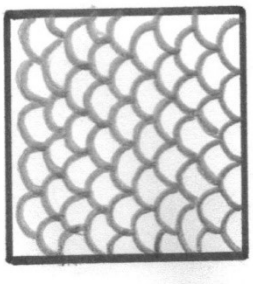
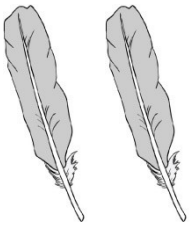
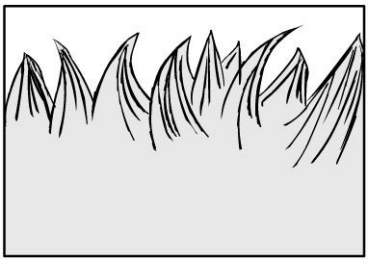
5 Penses-tu que le carcajou nait dans un œuf? Entoure ta réponse.

oui non

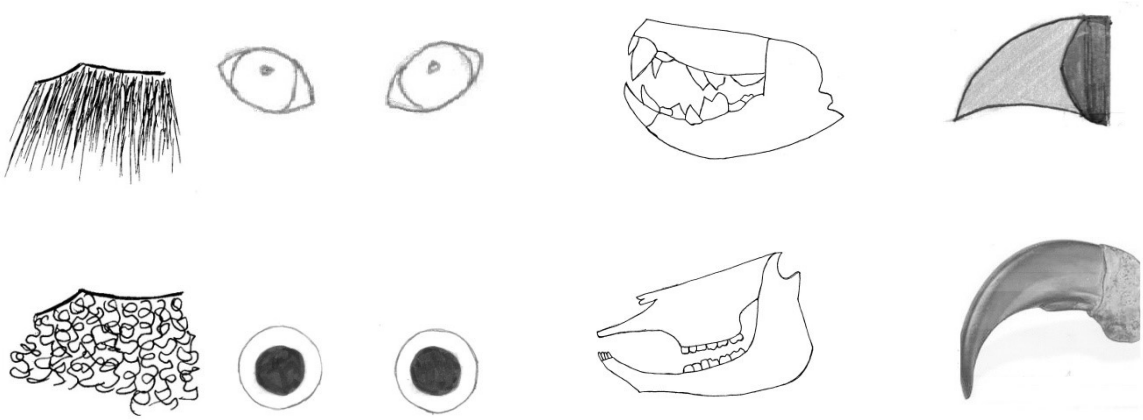
Peux-tu expliquer pourquoi?

---

6 Qu'est ce qui recouvre la peau du carcajou (des écailles, des plumes ou des poils)? Entoure ta réponse.

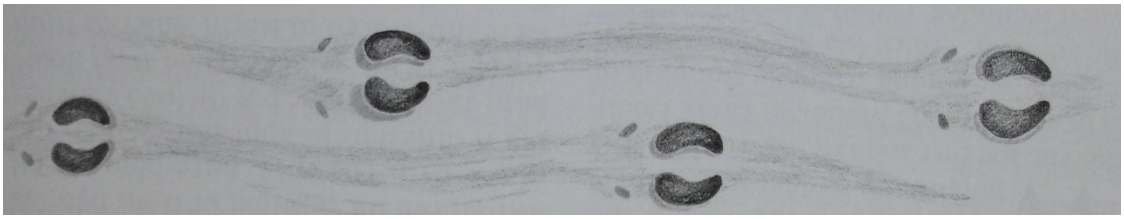




7 Quels sont parmi les 2 réponses possibles, ce qui appartient au carcajou (quel type de poils, yeux, mâchoire et griffe). Entoure tes réponses.



8 Quel est l'empreinte du carcajou? Met le nom des animaux sous les empreintes : lièvre, ours, carcajou, caribou.

_____ (un seul nom d'animal)

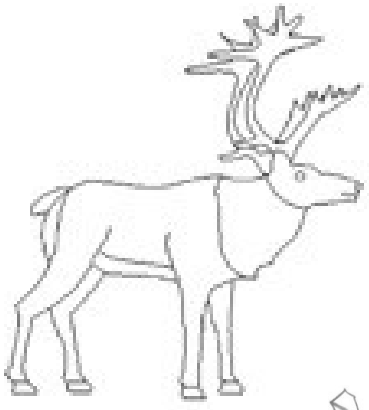


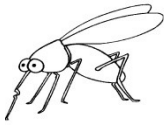
_____ (un seul nom d'animal)

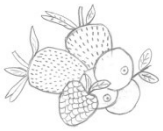
_____ (un seul nom d'animal)

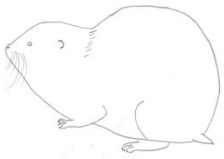
_____ (un seul nom d'animal)

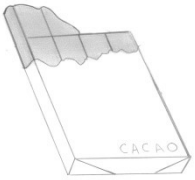
9 Que mange le carcajou? Entoure tes réponses.

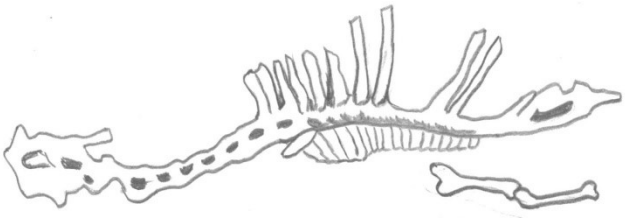




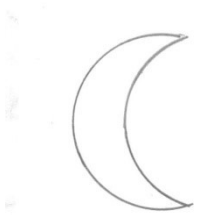


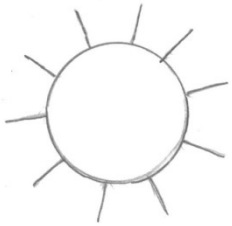






10 Le carcajou est-il plus actif le jour (diurne) ou la nuit (nocturne). Colorie ta réponse.





11 Dans quel environnement vit le carcajou? Entoure tes réponses.

12 Aimerais-tu rencontrer un carcajou dans la nature? oui non

Pourquoi?_____

13 Penses-tu que rencontrer un carcajou est dangereux ? oui non

Pourquoi?_____

14 Penses-tu que le carcajou est important pour sa fourrure? oui non

Pourquoi?_____

15 Penses-tu que le carcajou est important pour les cérémonies et /ou les légendes, et/ou les histoires ? oui non

Pourquoi?_____

16 Penses-tu qu'il faut chasser le carcajou? oui non

Pourquoi?_____

17 Penses-tu que toutes les espèces animales sont importantes? oui non

Pourquoi ?_____

18 Penses-tu que le carcajou est beau? oui non

Pourquoi?_____

19 Penses-tu qu'il faut protéger le carcajou? oui non

Si oui, pourquoi et que peux-tu faire pour protéger le carcajou ?

_____

_____

_____

20 Comment sera ton environnement quand tu seras grand ?

_____

_____

_____

Annexe 6 – Questionnaire pour le public adulte du Zoo de St Félicien

Projet Carcajou – Questionnaire adulte

Classe d'âge: ___18-30; ___31-45; ___; 46-59; ___ +60

Sexe : ___F; ___M

Canadien : oui__ ; non ___ ; **Autochtone** ___ , **Métis** ___ **Province** ___ ; **autre** ____

Lieu de résidence : Vous pouvez juste mettre le nom de la ville et ne pas remplir la suite

_____ (Préciser le pays et la province/Territoire)

- Grande ville (ex :Montréal + de 250 000 hab.) ;
- Ville (Trois-rivières entre 100 000 hab et 250 000 hab) ;
- Ville près de la campagne (ex : Rimouski entre 20 000 et 100 000 hab,);
- Village (ex : St Félicien, entre 5 000 et 20 000 hab)
- moins de 5000 hab

SECTION 1: avant la visite du zoo

1 - Avez-vous déjà visité le zoo? ___ Oui; ___ non

2 - Pour vous, qu'évoque le carcajou en trois mots? _____ ; _____ ; _____

3- Que représente un carcajou pour vous?

_____

_____

4 - Savez-vous ce qu'est un carcajou? ___ Oui; ___ non , si oui _____

5 - A quelle famille appartient le carcajou ? _____

6 - Est-ce qu'une de ces photos représente un carcajou ? ___ Oui; ___ non ; si oui quel numéro ? ____

7 - Où vivent les carcajous (vous pouvez cochez plusieurs réponses) ?

o Amérique du Nord	o Australie
o Asie	o Amérique du Sud
o Afrique	o Europe

8 - Que mange le carcajou (détailler, donner des exemples, plusieurs réponses possibles)?_____

_____

9 - Quel poids fait un carcajou ?

- **10/20 kgs (20 à 40 lb)**
- **20/30 kgs (40 à 60 lb)**
- **+ 30 kgs (+ de 60 lb)**

10 - Combien de temps vit un carcajou dans la nature?

- **5/15 ans**
- **15/25 ans**
- **+ 25 ans**

11 Connaissez-vous un autre nom pour le carcajou ? _____

SECTION 2: après la visite du zoo

a) Êtes vous allé à l'enclos des carcajous : ___oui ; __non

b) Avez-vous vu le carcajou : ___oui ; __non

12 - Comment décririez-vous le carcajou?

_____

_____

13 - Pensez-vous personnellement que les carcajous ont une importance? ___ oui; ___non

13a Laquelle?_____

14 - Cochez ce qui s'applique et répondez

	d'accord	**pas d'accord**	**ne sais pas**	**Pourquoi en quelques mots?**
J'aimerais voir un carcajou dans la nature				
Les carcajous ont un rôle dans l'écosystème				
Les carcajous sont dangereux car ils peuvent attaquer l'homme				
Les carcajous sont de beaux animaux				
Les carcajous ont le droit d'exister comme les autres animaux				
On devrait chasser/tuer les				

carcajous				
Les carcajous sont importants il faut les protéger				
Les carcajous ont un rôle dans la culture et la spiritualité				

15 Combien de points attribueriez-vous aux animaux suivants sachant que vous avez 10 points au total et sur une échelle de 1 à 10, 10 indique la valeur de conservation la plus haute et 1 la plus basse ; ex : 3/10 oiseau, 5/10 insecte, 1/10 poisson, 1/10 reptile (total 10)

carcajou _____/10**,** loup _____/10

ours _____/10, lynx _____/10

16 Seriez-vous prêt à financer les programmes de conservation du Carcajou?

___ oui; ___ non

16 a si oui, combien seriez vous prêt à donner en un seul paiement et une seule fois

___ 1$, ___ 5$, ____10$, ____15$, ____50$, ____100$, ____200$,____500$; ___ + de 500$

Annexe 7 –permis d'éthique du CERFAS et son renouvellement en 2019

No de certificat : CERFAS-2013-14-201-D

Faculté des arts et des sciences
Vice-décanat à la recherche

COMITÉ D'ÉTHIQUE DE LA RECHERCHE DE LA FACULTÉ DES ARTS ET DES SCIENCES (CERFAS)

CERTIFICAT D'ÉTHIQUE

Le Comité d'éthique de la recherche de la Faculté des arts et des sciences, selon les procédures en vigueur et en vertu des documents qui lui ont été fournis, a examiné le projet de recherche suivant et conclu qu'il respecte les règles d'éthique énoncées dans la *Politique sur la recherche avec des êtres humains* de l'Université de Montréal :

TITRE : ***"Conservation du Carcajou (Gulo gulo) et perception de cette espèce par les populations locales : Études de cas en Suède et dans les territoires du Nord Ouest"***

REQUÉRANTS : ***BONAMY, Morgane, étudiante au doctorat en géographie, Département de géographie***

sous la direction de :

HERRMANN, Thora , professeure agrégée, Département de géographie

MODALITÉS D'APPLICATION :
Tout changement anticipé au protocole de recherche devra être communiqué au CERFAS qui en évaluera l'impact au chapitre de l'éthique.

Toute interruption prématurée du projet ou tout incident grave devra être immédiatement signalé au CERFAS.

Selon les exigences éthiques en vigueur, **un suivi annuel est minimalement exigé afin de maintenir la validité de ce certificat**, et ce, jusqu'à la fin du projet. Le questionnaire de suivi peut être consulté sur la page Web du CERFAS.

[redacted]
Ryoa Chung, présidente
Comité d'évaluation déléguée

Date de délivrance : 2014/02/13 (AAAA / MM / JJ)

Date d'échéance : 2018 / 02 / 03 (AAAA / MM / JJ)

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Téléphone : 514-343-7338
cerfas.info@umontreal.ca

Université de Montréal

N^O de certificat
CERFAS-2013-14-201-D(1)

Comité d'éthique de la recherche en arts et humanités (CERAH)

CERTIFICAT D'APPROBATION ÉTHIQUE
- 1er renouvellement -

Le Comité d'éthique de la recherche en arts et humanités (CERAH), selon les procédures en vigueur et en vertu des documents relatifs au suivi qui lui a été fournis conclu qu'il respecte les règles d'éthique énoncées dans la Politique sur la recherche avec des êtres humains *de l'Université de Montréal.*

Projet	
Titre du projet	**Conservation du carcajou (gulo gulo) et perception de cette espèce par les populations locales au Canada (Ancien titre "Conservation du carcajou (gulo gulo) et perception de cette espèce par les populations locales : études de cas en Suède et dans les territoires du Nord Ouest")**
Étudiante requérante	**Morgane Bonamy** [redacted], Étudiante au doctorat, FAS - Département de géographie
Sous la direction de	Thora Herrmann, Professeur agrégé, FAS - Département de géographie, Université de Montréal
Note :	[redacted]

Annexe 8 – permis d'éthique des NWT

Licence No. 15456
File No. 12 410 981
April 10, 2014

2014
Northwest Territories Scientific Research Licence

Issued by:	**Aurora Research Institute – Aurora College** Inuvik, Northwest Territories
Issued to:	Ms. Morgane MB Bonamy Universite de Montreal [redacted]
Affiliation:	Universite de Montreal
Funding:	Dialog Bourse Excellence Pour le Doctorat Faculte des Etudes Superieures
Team Members:	
Title:	**Wolverine (Gulo gulo) conservation and perceptions by local populations: Case studies in Sweden and the Northwest Territories, Canada**
Objectives:	To study the biogeography, the ecology, and the human-animal relationships of wolverines across the Northern Circumpolar Region in two study sites: Northwest Territories, Canada and Sweden.
Dates of data collection:	May 1, 2014 to June 20, 2014.
Location:	Yellowknife

Licence No.15456 expires on December 31, 2014
Issued in the Town of Inuvik on April 10, 2014

[redacted]
Pippa Seccombe-Hett
Director, Aurora Research Institute